

STATE OF ALASKA

Jay S. Hammond, Governor



Annual Performance Report for

HARVEST ESTIMATES OF SELECTED
FISHERIES THROUGHOUT SOUTHEAST
ALASKA

by

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ALASKA DEPARTMENT OF FISH AND GAME

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Stuart Robards

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations
Project No.: F-9-10 of Alaska
Study No.: G-I Study Title: INVENTORY & CATALOGING
Job No.: G-I-Q Job Title: Harvest Estimates of
Selected Fisheries
Throughout Southeast Alaska

Period Covered: July 1, 1977 to June 30, 1978

ABSTRACT

The contribution of chinook, Oncorhynchus tshawytscha (Walbaum); coho, O. kisutch (Walbaum); and pink salmon, O. gorbuscha (Walbaum), released from Juneau area salmon rearing facilities to the marine recreational fishery in the Juneau area was determined by interviewing anglers during the period May 1 through September 30, 1977. An estimated 78 (1.8%) of the 4,329 chinook and 152 (1.6%) of the 9,459 coho salmon caught by anglers were reared at salmon rearing facilities in the Juneau area. No marked pink salmon from a rearing facility were observed during the sampling period.

The catch rate of chinook salmon by anglers in the Juneau area has declined from 0.243 to 0.059 chinook salmon per angler trip from 1960 to 1975. This trend has been reversed from 1975 to 1977 and risen from 0.059 to 0.080 chinook salmon per angler trip. The catch rate of coho salmon has increased from 0.086 in 1960 to 0.175 coho salmon per angler trip in 1977. There has been a rapid increase in angler participation from 11,934 in 1960 to 44,240 in 1977. In the Juneau salmon derby there has also been an increase in angler participation from 3,511 in 1959 to 8,762 in 1977. However, the catch rate of chinook and coho salmon during the derby has declined from 0.170 to 0.018 chinook salmon per angler trip and 0.246 to 0.138 coho salmon per angler trip from 1960 through 1977.

Anglers made an estimated 10,144 trips and spent 35,227.25 hours fishing along the Juneau area roadside. They caught an estimated 8,012 Dolly Varden, Salvelinus malma (Walbaum); 1,474 pink, 690 coho, 550 sockeye, O. nerka (Walbaum), and 22 chinook salmon; 1,345 cutthroat, Salmo clarki Richardson, 892 brook, Salvelinus fontinalis (Mitchill), and 48 rainbow trout, Salmo gairdneri Richardson; and 629 fishes of other species.

Anglers in the Wrangell area made an estimated 1,157 trips to fish for 360 chinook salmon during the period April 7 through May 20. During the

Wrangell King Salmon Derby an estimated 209 angler trips were made to catch 33 chinook salmon. Sampling was curtailed, as an area closure was enacted to protect the Stikine River chinook salmon run.

In the marine recreational fishery in North Behm Canal the anglers at Yes Bay and Bell Island lodges made 2,977 trips to catch 594 chinook, 131 coho, 614 pink, and 10 chum salmon, O. keta (Walbaum); 18 Pacific halibut, Hippoglossus stenolepis Schmidt; and 149 fishes of other species.

An estimated 29,878 angler trips were made in the Ketchikan area marine recreational fishery during the period May 15 through September 3, 1977, to catch 1,239 chinook, 1,453 coho, 11,904 pink, 76 chum, and 23 sockeye salmon; 6 trout, Salmo spp., and char, Salvelinus spp.; 569 Pacific Halibut; and 8,311 fishes of other species. In the Ketchikan King Salmon Derby an estimated 3,808 anglers fished during the 7-day derby to catch 473 chinook, 6 coho, and 1 chum salmon; 105 trout and char; 109 Pacific halibut; and 1,260 fishes of other species.

BACKGROUND

Juneau Area

To increase the numbers of salmon available to anglers in the Juneau area, the Mendenhall Lakes, Fish Creek, and Auke Creek facilities have continued to rear and release chinook, coho, and pink salmon, into Juneau area waters. A summary of released stocks expected to return to the Juneau area and contribute to the recreational fishery is contained in Table 1.

To monitor the numbers of chinook and coho salmon returning to the Juneau area and to estimate the benefit derived by the anglers from the increased production by the Juneau area rearing facilities, a harvest study was conducted. The study was similar in design to that conducted in previous years to facilitate identification of trends in the Juneau area marine recreational fishery (Figure 1).

With the increasing angler pressure in the marine fishery in the Juneau area increased concern was expressed by management to gain a current estimate of the angler effort and catch from systems accessible along the road system (Figure 2). The Juneau area roadside fishery was surveyed previously in 1972 to determine the angler effort and catch by species. However, a current study was needed to determine the current magnitude of angler pressure on roadside fish stocks and to evaluate if subsequent changes in regulations were necessary.

During the study periods in the Juneau area marine and roadside fisheries regulations restricted the take of various fish species by anglers. In the marine and roadside fisheries and throughout southeast Alaska the daily bag limit was 10 fish of trout, and char, and the possession limit was 20 fish with no more than 2 fish over 51 cm (20 inches) long. The

Table 1. Summary of salmon releases from Juneau area rearing facilities expected to return to the 1977 Juneau area marine recreational fishery.

<u>Salmon Species</u>	<u>Year Released</u>	<u>Release Site</u>	<u>Identifiable Mark</u>	<u>Percent Marked</u>	<u>Total Release</u>
Chinook	1974	Mendenhall Lakes	Ad ¹	42.5	93,129
Chinook	1974	Mendenhall Lakes	1/2 D ²	100.0	124,309
Coho	1976	Auke Creek	Ad + CWT ³	100.0	765
Coho	1976	Auke Creek	Ad + CWT ⁴	100.0	2,227
Coho	1976	Mendenhall Lakes	Ad + CWT ⁵	36.6	38,694
Coho	1976	Mendenhall Lakes	Ad + CWT ⁶	100.0	2,430
Coho	1976	Mendenhall Lakes	Ad + CWT ⁷	100.0	4,233
Coho	1976	Mendenhall Lakes	Ad + CWT ⁸	30.5	48,231
Coho	1976	Fish Creek	Ad + CWT ⁹	100.0	21,951
Coho	1976	Fish Creek	Ad + CWT ¹⁰	100.0	21,681
Coho	1977	Fish Creek	Ad + CWT ¹¹	97.2	10,648
Coho	1976	Salmon Creek	RV ¹²	100.0	21,525
Coho	1976	Sheep Creek	RV ¹²	100.0	21,950
Pink	1976	Auke Creek	Ad + V ¹³	100.0	368,000

¹Adipose finclip.

²Half dorsal finclip.

³Adipose finclip and implanted micro wire tag (binary code 4-3-10).

⁴Adipose finclip and implanted micro wire tag (binary code 4-3-11).

⁵Adipose finclip and implanted micro wire tag (binary code 4-4-2).

⁶Adipose finclip and implanted micro wire tag (binary code 4-4-3).

⁷Adipose finclip and implanted micro wire tag (binary code 4-4-4).

⁸Adipose finclip and implanted micro wire tag (binary code 4-4-14).

⁹Adipose finclip and implanted micro wire tag (binary code 4-4-15).

¹⁰Adipose finclip and implanted micro wire tag (binary code 4-5-1).

¹¹Adipose finclip and implanted micro wire tag (binary code 4-16-6).

¹²Right ventral finclip.

¹³Adipose and left or right ventral finclips.

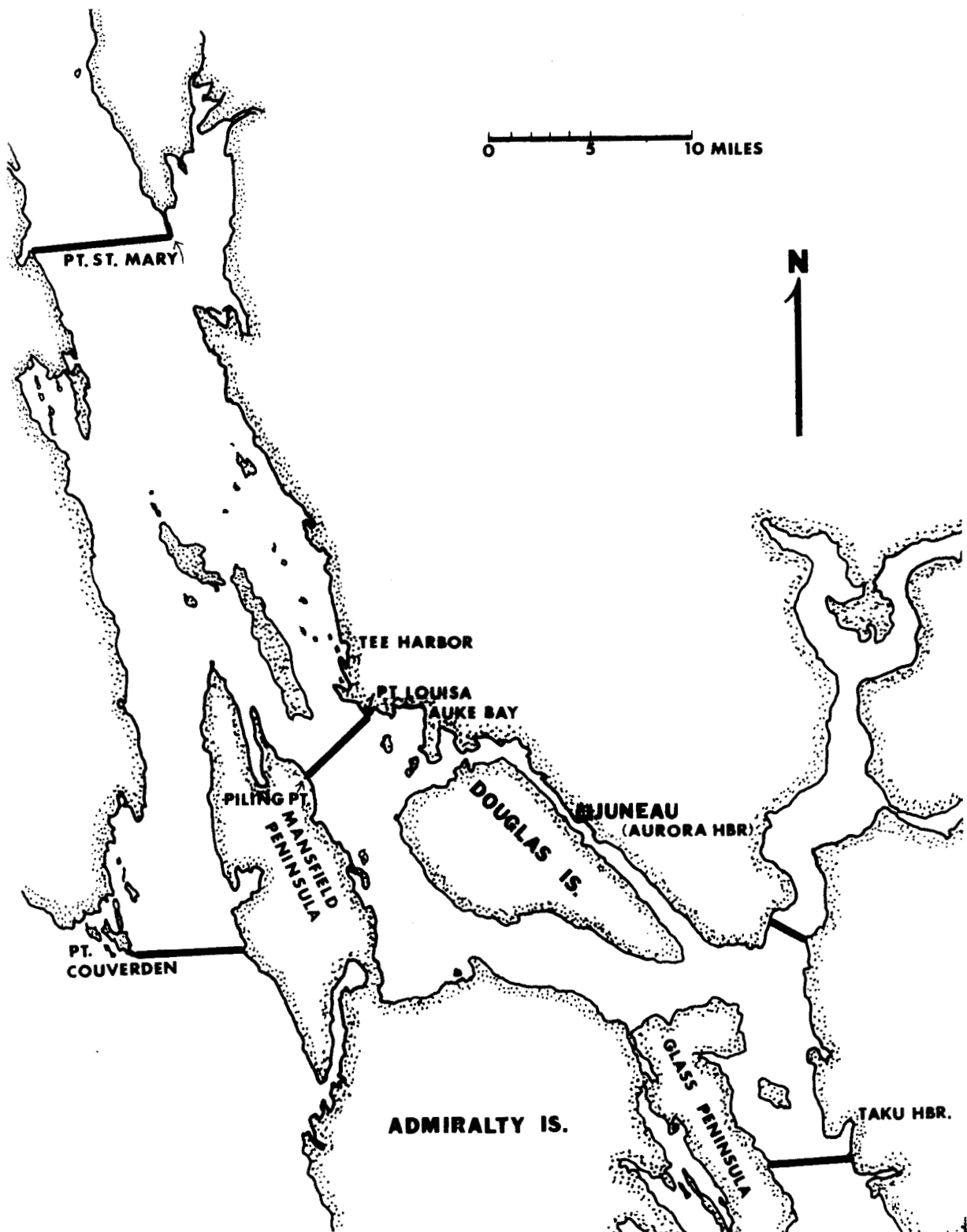


Figure 1. Map of Juneau area marine recreational fishery. The contiguous waters south of the line from Piling Point to Point Louisa to the southern study boundary at the entrance of Taku Harbor were closed to chinook salmon fishing from April 15 through June 14, 1977. Thereafter the bag limit was one chinook salmon per day for anglers in the Juneau area.

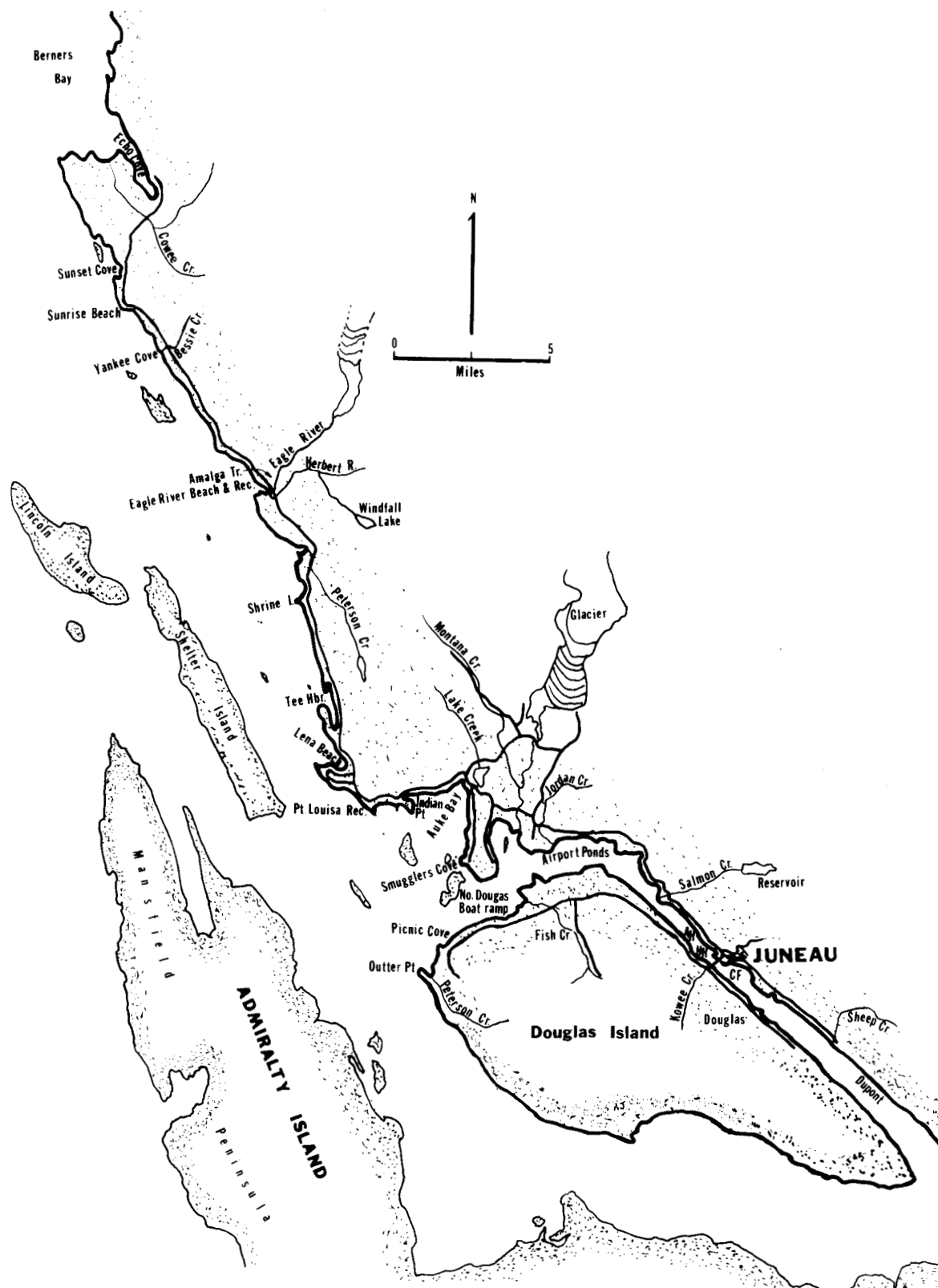


Figure 2. Map of Juneau area roadside recreational fishery (AH - Aurora Harbor, HH - Harris Harbor, and CF - City Float).

take of salmon was restricted to six salmon daily except chinook salmon. The possession limit was two daily bag limits except for chinook salmon from April 15 through June 14, 1977. The contiguous waters south of a line from Piling Point and Point Louisa to the southern study boundary at the entrance of Taku Harbor was closed to the taking of chinook salmon. Thereafter the daily bag and possession limit was one chinook salmon in the Juneau area (Figure 1). The 71 cm (28 inches) minimum length restriction for chinook salmon continued in effect regionwide throughout the season. The taking of Pacific halibut was limited to a daily bag and possession limit of two fish. Salmon, except king salmon, could also be taken if they were 40.5 cm (16 inches) or less in length. A total daily limit of ten fish and a possession limit of two daily bag limits could be taken of these small salmon.

Of the streams considered in the roadside study, downstream areas of Fish Creek, Auke Creek, and Salmon Creek were closed to fishing. Sheep Creek and Jordan Creek were closed to the taking of salmon. All other systems covered in the study (Figure 2) could be fished subject to the regionwide daily bag and possession limits.

Wrangell Area

The Stikine River chinook salmon stocks that frequent the Wrangell area (Figure 3) have been severely depleted. As a result, management needed a measure of the recreational catch to determine the relative timing and abundance of the area's chinook salmon stocks.

The fishery was closely regulated during the study period. During the sampling the limit was the Southeast areawide bag limit of three chinook salmon per day, and the possession limit was two daily limits; the 71 cm minimum length restriction for chinook salmon was in effect. The area was closed to fishing May 24, 1977. Sampling was curtailed after the first weekend of the Wrangell King Salmon Derby's Special Derby Days.

North Behm Canal Area

With the increased popularity of visiting anglers to the Yes Bay Lodge and Bell Island Hot Springs Resort, the North Behm Canal area salmon stocks, particularly the chinook salmon, have come under increasing pressure. To determine the current level of angler effort and catch, a direct census was deemed feasible by virtue of the anglers returning to these two resorts daily after fishing (Figure 4).

During the study period the anglers fishing in the area of these two lodges at Yes Bay and Bell Island were restricted to a daily bag and possession limit of one chinook salmon. This restriction was lifted July 13 to the regionwide limit of a daily bag limit of three chinook salmon and one daily bag limit in possession. The minimum length restriction of 71 cm was in effect for chinook salmon. Concurrent with the chinook salmon regulations was the regionwide daily bag limit of six salmon and two daily bag limits in possession. The taking of Pacific halibut was limited to a daily bag and possession limit of two fish.

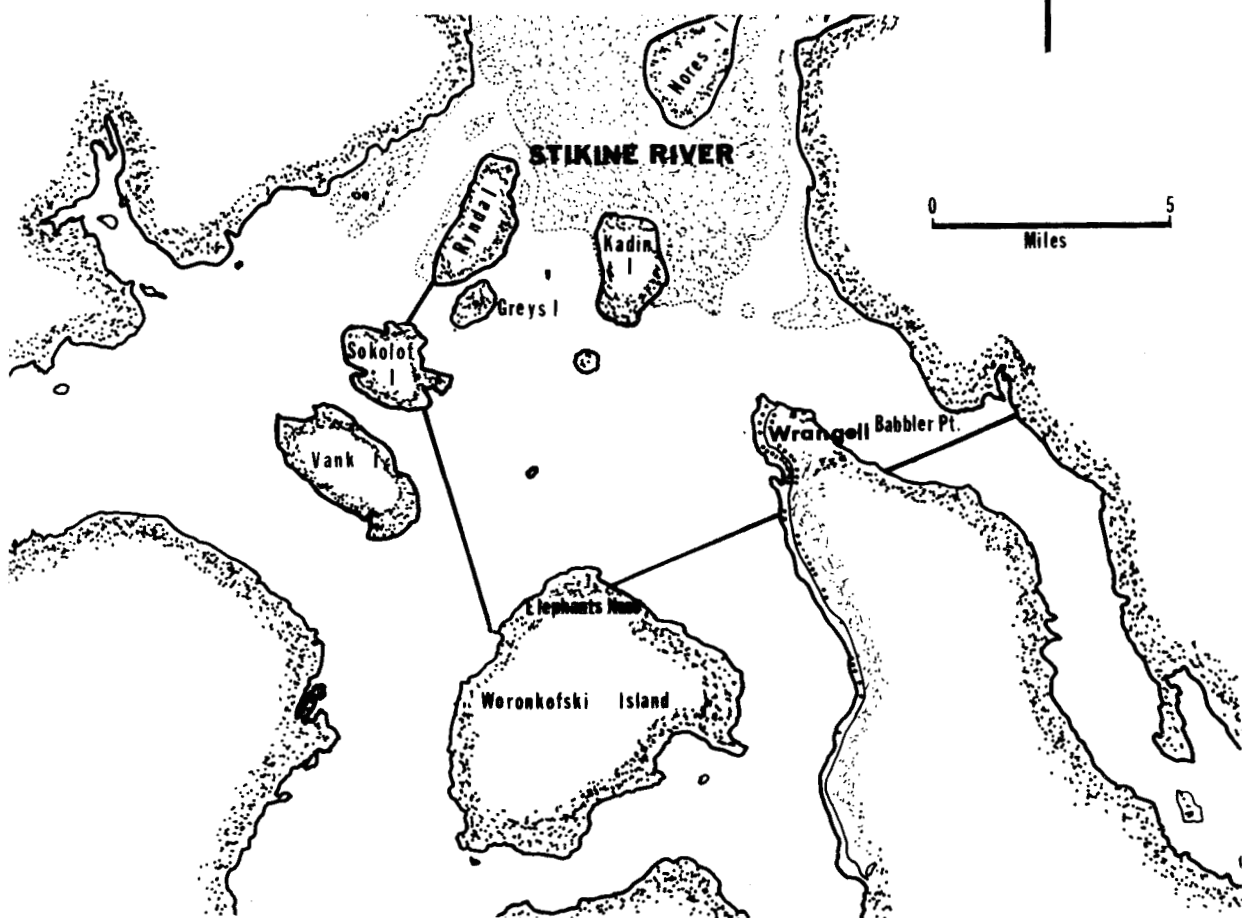
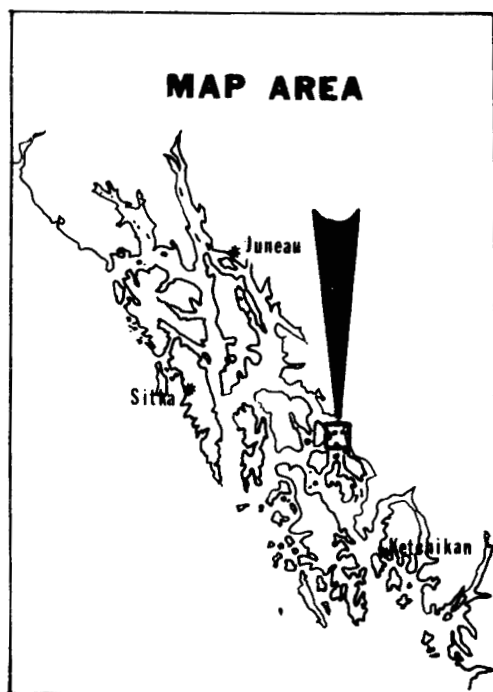


Figure 3. Wrangell area marine recreational fishery.

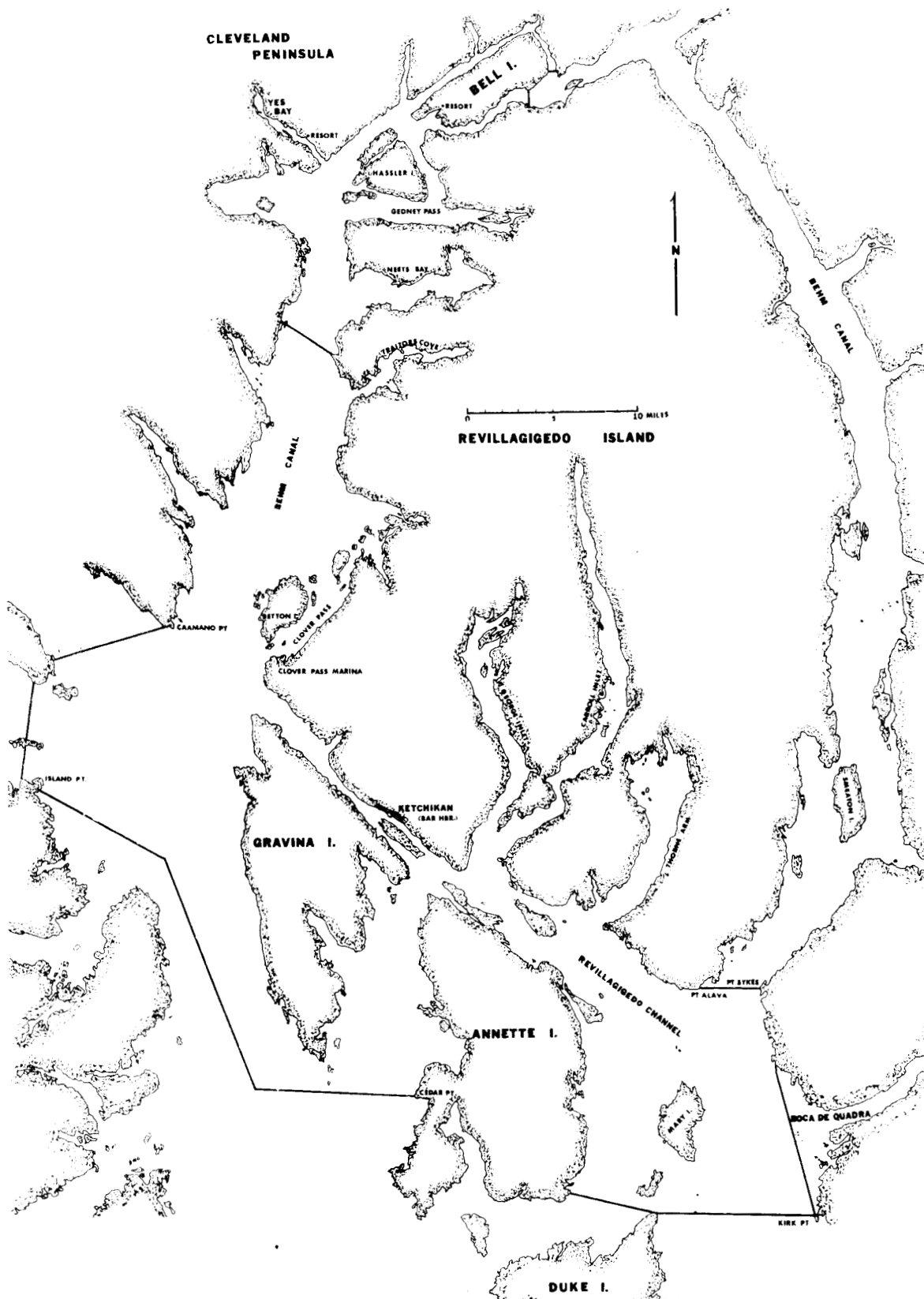


Figure 4. North Behm Canal area and Ketchikan area marine recreational fisheries. (North Behm Canal area was considered that area north of a line at the mouth of Traitor's Cove to the closure boundaries on Bell Island.)

Ketchikan Area

As the previous study of the Ketchikan area marine recreational fishery was conducted in 1973, a current measure was needed by management to evaluate the level of angler effort and catch in the area. The area covered by previous studies in the Ketchikan area was enlarged (McHugh et al, 1970). The enlarged area bordered on the North Behm Canal area study, west to Island Point, and south to include part of the Annette Island coastline and the Boca de Quadra area (Figure 4).

During the study period in the area north and east of a line between Point Higgins to Caamano Point to a line on the southern and eastern coasts of Bell Island and Revillagigedo Island and the mainland, the daily bag and possession limit was one chinook salmon from May 1 through July 12 (Figure 4). Thereafter it reverted back to the regionwide limit for chinook and other salmon. The limits for trout, char, and Pacific halibut were the same as the Southeastern regionwide limits.

RECOMMENDATIONS

Management

1. In the Juneau area the one chinook salmon daily bag and possession limit should continue in effect. Further, the closed area north of the latitude of Limestone Inlet (south side) to a line from Point Louisa to Piling Point should be closed for the period April 15 through April 14 to insure adequate escapement of chinook salmon into the Taku River. With the increased angler effort in the Juneau area this regulation will continue to be necessary until all year classes of the Taku chinook salmon stocks can increase in population size.
2. The fishery for sockeye salmon occurring seasonally in Auke Bay should be monitored closely with increased angler pressure being placed on that stock. In the future it may be necessary to reduce the daily bag and possession limit, enlarge the closed area at the mouth of Auke Creek, close the bay to sockeye salmon fishing, or a combination of these options to insure adequate escapement into Auke Creek.
3. In the Juneau area the take of Dolly Varden should be reduced to a bag and possession limit of five fish, only two of which may be over 12 inches in length.

This regulation change should be implemented to maintain Dolly Varden at a desirable catch rate and to prevent overharvesting.

4. The immediate Wrangell area and Dry Pass area should be closed to insure adequate escapement of chinook salmon to the Stikine River. The Stikine chinook salmon stocks are low in numbers and need this seasonal closure to reestablish previous population levels.

5. The daily bag and possession limit of one chinook salmon should continue in effect in the North Behm Canal area defined as that area north of a line from Point Higgens to Caamano Point to a line at the longitude of the outlet of Long Lake. This limit will enable visiting anglers at Clover Pass and Yes Bay and Bell Island lodges to continue to fish and still allow an adequate escapement to build up area chinook salmon stocks.

Research

1. The contribution from the Mendenhall Lakes rearing facility should be determined in 1978. The sample period should be from May through September so that chinook and coho salmon stocks frequenting the Juneau area can be sampled.
2. The angler effort and catch of Dolly Varden along the Juneau road system should be determined during the period May through August 1978. If the daily bag and possession limit is reduced to five Dolly Varden, the effectiveness of this regulation should be determined.
3. The angler effort and catch of chinook salmon in the Wrangell area should be determined in 1978 to assess the effectiveness of the closure area and assess the impact on the area chinook salmon stocks.
4. The marine recreational fisheries in the North Behm Canal and Ketchikan areas should be studied every second or third year to determine any trends in angler effort and catch on area fish stocks. Studies should be conducted sooner if a resource conflict is anticipated or regulatory changes are implemented.

OBJECTIVES

1. Determine the saltwater boating angler effort and catch in the Juneau area and to further determine the contribution of chinook, coho, and pink salmon produced from the Mendenhall Lakes Salmon Rearing Facility, the Fish Creek Estuarine Rearing Facility, and the Auke Creek Hatchery to the Juneau area saltwater sport fishery.
2. Determine the angler effort and catch in the Juneau area roadside sport fishery.
3. Determine the saltwater boating angler effort and catch in the Wrangell area sport fishery.
4. Determine the saltwater boating angler effort and catch in the North Behm Canal area sport fishery.

5. Determine the saltwater boating angler effort and catch in the Ketchikan area sport fishery.

TECHNIQUES USED

Juneau Area Recreational Harvest Study

Marine Recreational Harvest Study:

Anglers fishing from boats in the Juneau area (Figure 1) were interviewed as they returned to Auke Bay, Aurora Harbor, and Tee Harbor. Each angler party contacted was interviewed to determine the number of anglers aboard; the time spent fishing; the number and species of each fish kept; and the number of marked and unmarked chinook, coho, and pink salmon kept.

Angler parties were interviewed at Auke Bay from May 1 through September 30, at Tee Harbor from May 21 through September 30, and at Aurora Harbor from June 18 through September 30.

During each biweekly period the study was conducted on four randomly selected weekdays and four weekend days. If a holiday occurred during the period, it was included with the weekend days; and four of these days were then randomly selected for sampling. Anglers were interviewed on 85 (57%) of the 150 weekdays and weekend-holidays and during the 3-day derby. Anglers were interviewed during the early hours, 0600 through 1400, and late hours, 1400 through 2200, of a day sampled and all day during the derby. The study design was similar to the study conducted in 1975 (Robards, 1976).

An estimate of the number of anglers, time spent fishing, and the number of fish kept by species was derived by:

1. The number of recreational boats in the Juneau area was noted from an aircraft during a 1.5- to 2.0-hour period randomly selected between 0600 and 2200 hours. During the study period 6 counts were made during the early weekday stratum, 11 were made during the late weekday stratum, 4 were made during the early weekend day stratum, and 7 were made during the late weekend day stratum.
2. The number of recreational parties that were interviewed and had indicated that they were out in the Juneau area during the time of a count was noted.
3. The counts made during early hours were adjusted for those parties that were out during a count and had returned after the technicians stopped interviewing. This adjustment was made by sampling an adjacent weekend or weekday during the late hours. Parties in that late period that reported they were out during the count time were added to the number interviewed during the early period that had reported being out during the count time.

4. A mean ratio of the number of recreational boats counted to the number of those boats interviewed was then calculated separately for each stratum.
5. The number of anglers; hours spent fishing; fish kept by species; and the number of marked and unmarked chinook, coho, and pink salmon kept were summed for each stratum. These summed parameters were then multiplied by the appropriate mean ratio. These estimates were then weighted appropriately for each stratum and summed for the estimates of angler effort and catch for the study period.

A scale and gonad sample were taken from each chinook salmon examined. Both testes lobes were collected from a male chinook salmon, and a sample of each female chinook salmon's egg skein was collected. These samples along with physical measurement data were forwarded to the chinook salmon studies project leader for his information.

Golden North Salmon Derby:

The Golden North Salmon Derby was monitored at each judge's float located at Tee Harbor, Auke Bay, and Douglas Harbor. All salmon observed were examined for any marks or tags, and the number of participating anglers was obtained from derby records.

Anglers were also sampled to determine the number of each species kept and not entered for prizes. A derby estimate was then prepared by multiplying the mean number of each species kept per angler by the number of validated anglers.

Comparison of Juneau Area Marine Recreational Harvests:

Study data from previous harvest studies conducted from 1960 through 1977 was standardized to compare trends in angler effort and catch success. Comparative seasonal and salmon derby mean catch per angler trip was presented for chinook and coho salmon. A summary was compiled from records of the Juneau salmon derby for the years 1959 through 1976 to illustrate trends in angler effort and catch success.

Juneau Area Roadside Recreational Harvest Study

The Juneau area roadside fishery study was conducted from May 1 through September 4, 1977. During the study 88 (58%) of the 153 days in the season were sampled.

Angler parties were contacted along the Juneau road system while fishing or after completing fishing (Figure 2). Each angler party contacted was interviewed to determine the number of anglers, time spent fishing, the number of fish kept by species, and whether they had completed or were still fishing.

In addition to actually checking an area for anglers, vehicles parked alongside the road adjacent to known fish streams or trails to lakes

were checked. If the angler party was not in the immediate area, then a questionnaire was left on the vehicle's windshield.

During each biweekly period the study was conducted on four randomly selected weekdays and four weekend days. If a holiday occurred during the period, it was included with the weekend days; and four of these days were then randomly selected for sampling. Anglers were interviewed during the early hours, 0600 through 1400, or late hours, 1400 through 2200, on a sample day.

Two technicians were employed for the study. In the initial design one technician started counting anglers, and the second technician interviewed those anglers who could be contacted and left cards on other anglers' vehicles. Due to the large distance to cover and numerous turnoffs and trails, this procedure was found to be inadequate. A second sampling scheme was implemented whereby the Juneau road system was divided into two areas. The first area started at Echo Cove and stopped at Auke Bay, and the second started at Auke Creek and stopped at Outer Point (Figure 2). Within their respective areas the technicians alternately counted and interviewed anglers.

An estimate of the number of anglers, time spent fishing, and the number of fish kept by species was derived by:

1. The three types of interviews, i.e., completed angler trips, incomplete angler trips, and questionnaire responses, were tested to determine if they were similar enough that their angler effort and catch data could be pooled. This was accomplished by calculating the mean catch rate per angler party, mean number of anglers per angler party, and mean elapsed time per angler party for each interview type. The associated standard deviation was also calculated for each parameter mean. The parameter mean and its associated standard deviation of the completed angler trip interviews was tested against those of the incomplete and postal card data sets. The number of angler parties indicating complete, incomplete, and postal card responses received from each area was counted and compared in effort to identify any obvious bias or source of error.
2. For each stratum in a biweekly period the number of anglers, hours spent fishing, and fish kept by species were calculated separately for interviews and questionnaires returned. The mean number of angler hours and fish kept by species per angler was calculated from the interview data; and the mean number of anglers, hours spent fishing, and fish kept by species per angler party was ascertained from the returned questionnaires. The mean number of hours spent fishing and fish kept by species per angler was multiplied by the number of anglers counted during the time the fishing occurred to yield estimates of angler effort and catch for that stratum. The mean number of anglers, hours spent fishing, and fish kept by species per angler party was multiplied by the number of vehicles counted during that stratum for which those questionnaires were issued.

Angler interviews were checked for anglers that could have been counted twice. If this occurred in sampling a stratum, then the angler counts were summed and divided by the mean elapsed time for angler trip.

Both the interview and questionnaire data sets were checked for those parties whose elapsed time overlapped from the early to late stratum of a sampled day. This number of anglers or parties was arbitrarily summed with those in the early stratum.

3. The estimates of angler effort and fish kept by species from each data set were then summed together, and each stratum was weighted appropriately. The respective strata estimates were then summed to produce biweekly estimates of angler effort and catch.

Wrangell Area Recreational Harvest Study

Marine Recreational Harvest Study:

Anglers fishing from boats in the Wrangell area (Figure 3) were interviewed as they returned to Wrangell Harbor. Each angler party was interviewed to determine the number of anglers aboard, the time spent fishing, and the number and species of fish kept.

The technician utilized a boat to facilitate his movement within the Wrangell Harbor to contact returning anglers and to make areawide boat counts.

During each week the study was conducted on three randomly selected weekdays and both weekend days. If a holiday occurred during a week, it was included with the weekend; and two of these days were then randomly selected for sampling. Anglers were interviewed on 31 (72%) of 43 weekdays and weekend days and on two derby days during the period April 8 through May 20, 1977.

The sampling design was initially stratified around the low tide period with the most associated daylight. From past observations other staff observed that angler activity was stratified such that the fishery occurred primarily around the low tide period and less effort during other periods of the day.

The sampling schedule was then formed by first randomly selecting three weekdays and two weekend days to be sampled during each week. Then for each day selected the approximate daylight hours of 0600 to 2300 were stratified into a low tide stratum and a remaining time stratum. This was accomplished by rounding the Ketchikan area tide table times to the nearest 0.25 hour and adding 6 minutes for the Wrangell area correction to the tables. This time was used to formulate the low tide stratum by adding a starting time 2 hours prior to and a stopping time 4 hours after that hour. The remaining time stratum was sampled by selecting a random starting time for a 2-hour sample on each of the days sampled.

The sample design was changed effective May 10 when it was determined that the technician was not able to obtain a representative sample of the fishery with the initial design. The stratification of sampling effort was changed to sample either the early hours, 0600 through 1400, or late hours, 1400 through 2300, of a weekday or weekend day.

One boat count was made during each stratum sampled. The starting time was randomly selected during the sampling time. The initial point counted and the direction in which the count proceeded was also randomly selected.

An estimate of the number of anglers, time spent fishing, and the number of fish kept by species was derived by:

1. The number of recreational boats in the Wrangell area was noted from a boat during a 1.0- to 1.5-hour period randomly selected from the early hours, 0600 through 1400, or late hours, 1400 through 2200, that were sampled.
2. The number of recreational parties that were interviewed and had reported that they were out in the Wrangell area during the time of the count was noted.
3. The counts made during early hours were adjusted for those angler parties that were out during a count and returned after the technician stopped interviewing. This adjustment was made by selecting another adjacent weekend or weekday sampled during the late hours. The number of parties in that late period that reported they were out during the count time were then arbitrarily summed with those in the early stratum.
4. A mean ratio of the number of recreational boats counted to the number of those boats interviewed was then calculated separately for each stratum sampled.

A ratio of the number of recreational boats counted to the number of those boats interviewed was then calculated separately for each stratum sampled.

5. The numbers of anglers, hours spent fishing, and fish kept by species were summed for each stratum. These sums were then multiplied by the appropriate mean count/interview ratio. These summed parameters were then weighted appropriately for each stratum and summed for the estimates of angler effort and catch for the study period.

During periods 2, 3, and 4 the technician sampling the fishery did not record interviews with unsuccessful angler parties. As a representative sample of angler catch success was not available for analysis, an unbiased estimate of catch and catch rate for these periods could not be calculated from the successful angler data. The estimate of chinook caught for these periods was derived based upon the mean catch rate for periods 1, 5, 6 and 7.

A scale and gonad sample were taken from each chinook salmon examined. Both testes lobes were taken from each male chinook salmon, and a sample of each female's egg skein was collected. These samples along with physical measurement data were forwarded to the chinook salmon studies project leader for his information.

Wrangell King Salmon Derby:

The Wrangell King Salmon Derby was monitored at the judges' float. The number of participating anglers, hours spent fishing, and chinook salmon caught was estimated utilizing the same methodology described above for the seasonal estimates.

North Behm Canal Area Recreational Harvest Study

Anglers staying at the Yes Bay Lodge and Bell Island Resort (Figure 4) were interviewed to determine their effort and catch. A technician was stationed at each lodge to conduct the study.

Anglers were interviewed at Bell Island Resort from May 26 through August 31 and at Yes Bay Lodge, June 2 through August 31.

Two technicians contacted anglers as they returned to the two lodges after fishing. Each angler party was interviewed to determine the number of anglers aboard, the time spent fishing, and the number and species of each fish kept.

At Bell Island the technician was unable to obtain the starting time from all anglers during some periods, so a sample was taken of elapsed trip times obtained during those periods and the mean elapsed time per trip from that sample was multiplied by the number of anglers fishing, for an estimate of the total number of hours fished for that period.

A scale and gonad sample was taken from each chinook salmon examined. Both testes lobes were collected from a male chinook, and a sample of each female chinook salmon's egg skein was collected. These samples along with physical measurement data were forwarded to the chinook salmon studies project leader for his information.

Ketchikan Area Recreational Harvest Study

Marine Recreational Harvest Study:

Anglers fishing from boats in the Ketchikan area (Figure 4) were interviewed as they returned to Clover Pass Resort and Bar Harbor. Each angler party contacted was interviewed to determine the number of anglers aboard, the time spent fishing, the number and species of fish kept, and if the fish kept had any marks or tags.

The study was conducted from May 15 through September 3, 1977. During each biweekly period the study was conducted on four weekdays and four weekend days. If a holiday occurred during the period, it was included with the

weekend days; and four of these days were then selected for sampling. Anglers were interviewed on 55 (46%) of 119 days, and the 7 derby days were sampled separately. Anglers were interviewed during the early hours, 0600 through 1400, or late hours, 1400 through 2300, of a day sampled.

An estimate of the anglers' time spent fishing and the number of fish kept by species was derived by:

1. The number of recreational boats in the Ketchikan area was noted from an aircraft during a 1.5- to 2.0-hour period randomly selected between 0600 and 2200 hours. During the study period five counts were made during the early weekday stratum, nine were made during the late weekday stratum, six were made during the early weekend day stratum, and seven were made during the late weekend day stratum.
2. The number of recreational parties that were interviewed and had indicated that they were out in the Ketchikan area during the time of a count was noted.
3. The counts made during early hours were adjusted for those parties that were out during a count and had returned after the technicians stopped interviewing. This adjustment was made by selecting another adjacent weekend or weekday sampled during the late hours. The number of parties in that late period that reported they were out during the count time were also added to the number that were interviewed during the early period who had reported that they were out during the count time.
4. A mean ratio of the number of recreational boats counted to the number of those boats interviewed was then calculated separately for each stratum.
5. The numbers of anglers, hours spent fishing, fish kept by species, and the number of marked and unmarked fish were summed for each stratum. These summed parameters were then multiplied by the appropriate mean ratio. These estimates were then weighted appropriately for each stratum and summed to comprise the estimates of angler effort and catch for the study period.

A scale and gonad sample were taken from each chinook salmon examined. Both testes lobes were collected from each male, and a sample of each female's egg skein was collected. These samples along with physical measurement data were sent to the chinook salmon studies project leader for his information.

Ketchikan King Salmon Derby:

The Ketchikan King Salmon Derby was monitored at each judge's float located at Clover Pass and Bar Harbor. All fish observed were examined for any marks or tags. The number of participating anglers and their catch was estimated based upon area count and subsequent angler interviews that were collected similar to the seasonal sample.

Anglers were also sampled to determine the number of each species kept and not entered for prizes. A derby estimate was then prepared by multiplying the mean number of each species kept per angler by the estimated number of anglers.

FINDINGS

Results

Juneau Area Marine Recreational Harvest Study:

During the study period an estimated 78 (1.8%) of the 4,329 chinook, O. tshawytscha (Walbaum), and 152 (1.6%) of the 9,459 coho salmon, O. kisutch (Walbaum), caught by anglers were reared at salmon rearing facilities or were part of a marked wild stock in the Juneau area. The estimated contribution of each released stock was based upon the number of marked salmon that were observed during the study and is contained in Table 2.

An estimated 4,329 chinook; 9,459 coho; 2,088 pink, O. gorbuscha (Walbaum); 109 chum, O. keta (Walbaum); and 1,747 sockeye salmon, O. nerka (Walbaum), were caught by anglers. In addition to the salmon 1,178 trout, Salmo spp., and char, Salvelinus spp.; 952 Pacific halibut, Hippeoglossus stenalepis Schmidt; and 509 fishes of other species (Pleuronectidae, Gadidae, and Sebastes spp.) were caught by anglers during the study period (Table 3). The mean seasonal catch rate expressed as catch per angler trip was 0.080 for chinook, 0.175 for coho, 0.039 for pink, 0.002 for chum, and 0.032 for sockeye salmon; 0.022 for trout and char; 0.018 for Pacific halibut; and 0.009 for fishes of other species combined (Table 4).

Golden North Salmon Derby:

The Golden North Salmon Derby was conducted on August 5, 6, and 7, 1977. Derby officials recorded that 4,549 tickets were sold and estimated that 8,762 daily validations were made. Derby participants entered 161 chinook, 1,206 coho, 259 pink, 28 chum, and 1 sockeye salmon for various prize categories. No marked salmon were observed during the derby sample.

During the derby anglers were also interviewed to determine if any fish they caught in the derby were not entered. From the "take home" sample an estimated 355 chinook, 2,419 coho, 45 pink, and 1 chum salmon and 202 Pacific halibut were kept and not entered in the derby. None of the salmon in the sample had any marks or tags.

Comparison of Juneau Area Marine Recreational Harvests:

Study data from harvest studies conducted in 1977 were standardized in format comparable to Robards (1977) to compare trends in seasonal parameters of interest.

Table 2. Summary of marked salmon observed and estimated contribution of rearing facilities in the Juneau area marine recreational fishery, May 1 - September 30, 1977.

<u>Salmon Species</u>	<u>Release Site</u>	<u>Mark/Tag Combination</u>	<u>Marked Salmon Sampled</u>	<u>Estimate of Marked Salmon Caught</u>	<u>Contribution to Fishery</u>
Chinook	Mendenhall Lakes	Ad ¹	1	21	49
Chinook	Mendenhall Lakes	1/2 D ²	2	29	29
Coho	Unknown	Ad ¹	3	23	23
Coho	Auke Creek	Ad + CWT ³	0	0	0
Coho	Auke Creek	Ad + CWT ⁴	0	0	0
Coho	Mendenhall Lakes	Ad + CWT ⁵	0	0	0
Coho	Mendenhall Lakes	Ad + CWT ⁶	0	0	0
Coho	Mendenhall Lakes	Ad + CWT ⁷	0	0	0
Coho	Mendenhall Lakes	Ad + CWT ⁸	0	0	0
Coho	Fish Creek	Ad + CWT ⁹	0	0	0
Coho	Fish Creek	Ad + CWT ¹⁰	1	91	91
Coho	Fish Creek	Ad + CWT ¹¹	2	38	38
Coho	Salmon Creek	RV ¹²	0	0	0
Coho	Sheep Creek	RV ¹²	0	0	0
Pink	Auke Creek	Ad + V ¹³	0	0	0

¹Adipose finclip.

²Half dorsal finclip.

³Adipose finclip and implanted micro wire tag (binary code 4-3-10).

⁴Adipose finclip and implanted micro wire tag (binary code 4-3-11).

⁵Adipose finclip and implanted micro wire tag (binary code 4-4-2).

⁶Adipose finclip and implanted micro wire tag (binary code 4-4-3).

⁷Adipose finclip and implanted micro wire tag (binary code 4-4-4).

⁸Adipose finclip and implanted micro wire tag (binary code 4-4-14).

⁹Adipose finclip and implanted micro wire tag (binary code 4-4-15).

¹⁰Adipose finclip and implanted micro wire tag (binary code 4-5-1).

¹¹Adipose finclip and implanted micro wire tag (binary code 4-16-6).

¹²Right ventral finclip.

¹³Adipose and left or right ventral finclips.

Table 3. Estimate of angler effort and catch by species in the Juneau area marine recreational fishery, May 1 - September 30, 1977.

Period	1 5/1- 5/14	2 5/15- 5/28	3 5/29- 6/11	4 6/12- 6/25	5 6/26 7/9	6 7/10- 7/23	7* 7/24- 8/6	8* 8/7- 8/20	9 8/21- 9/3	10 9/4- 9/17	11 9/18- 9/30	Season Total
Angler Trips	1,315	8,961	5,839	6,594	7,368	6,223	5,641	3,867	4,774	2,502	973	54,057
Angler Hours	6,464.5	46,762	30,020	30,181.5	36,746.25	31,489.5	28,754.5	20,974	25,171.75	14,120.5	4,536.75	275,221.25
Chinook Salmon	86	1,503	526	786	467	557	280	29	68	27	0	4,329
Coho Salmon	0	43	27	399	1,544	2,638	1,778	1,192	1,237	513	88	9,459
Pink Salmon	0	0	0	0	248	807	816	154	39	7	17	2,088
Chum Salmon	0	0	0	22	9	43	14	8	0	13	0	109
Sockeye Salmon	0	0	0	924	726	0	97	0	0	0	0	1,747
Total Salmon	86	1,546	553	2,131	2,994	4,045	2,985	1,383	1,344	560	105	17,732
Trout & Char	11	475	60	133	387	57	0	0	55	0	0	1,178
Pacific Halibut	0	22	39	21	76	115	56	204	358	53	8	952
Other Species**	54	22	0	21	19	93	36	8	202	54	0	509

*Data from the Golden North Salmon Derby is not included.

**Other species of families Pleuronectidae, Gadidae, and Scorpaenidae.

Table 4. Estimate of recreational catch per unit of effort in the Juneau area marine recreational fishery, May 1 - September 30, 1977.

Period	1 5/1- 5/14	2 5/15- 5/28	3 5/29- 6/11	4 6/12- 6/25	5 6/26- 7/9	6 7/10- 7/23	7* 7/24- 8/6	8* 8/7- 8/20	9 8/21- 9/3	10 9/4- 9/17	11 9/18- 9/30	Season Total
Sample Size (Anglers Contacted)	98	412	653	413	554	583	419	299	514	278	97	4,320
Chinook Salmon/ Angler Trip	0.065	0.168	0.090	0.119	0.063	0.090	0.050	0.007	0.014	0.011	0.000	0.080
Coho Salmon/ Angler Trip	0.000	0.005	0.005	0.060	0.210	0.424	0.315	0.308	0.259	0.205	0.090	0.175
Pink Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.034	0.130	0.145	0.040	0.008	0.003	0.017	0.039
Chum Salmon/ Angler Trip	0.000	0.000	0.000	0.003	0.001	0.007	0.002	0.002	0.000	0.005	0.000	0.002
Sockeye Salmon/ Angler Trip	0.000	0.000	0.000	0.140	0.099	0.000	0.017	0.000	0.000	0.000	0.000	0.032
Trout and Char/ Angler Trip	0.008	0.053	0.010	0.020	0.053	0.009	0.000	0.000	0.012	0.000	0.000	0.022
Pacific Halibut/ Angler Trip	0.000	0.002	0.007	0.003	0.010	0.018	0.010	0.053	0.075	0.021	0.008	0.018
Other Species**/ Angler Trip	0.041	0.002	0.000	0.003	0.003	0.015	0.006	0.002	0.042	0.022	0.000	0.009

*Data from the Golden North Salmon Derby is not included.

**Other species of families Pleuronectidae, Gadidae, and Scorpaenidae.

Comparative seasonal and salmon derby mean catch per angler trip for chinook salmon were illustrated in Figures 4 and 5, respectively. Figures were standardized to consider only chinook salmon caught greater than or equal to 66 cm (26 inches) in total length, except 1977. The angler catch of chinook salmon per angler trip in Figure 6 illustrated a sharp decline in catch rate from 1960 through 1962, a rise in 1963 and 1964, and a significant decline commenced in 1965 with occasional minor increases that progressed to 1977. The trend was negative, reflecting the decline in catch rate over the seasons 1960 through 1977. However, the trend would appear to have a greater negative slope if only the period from 1964 through 1977 was considered. The catch trend of chinook salmon in the salmon derby was illustrated in Figure 5. There was considerable fluctuation between 1959 and 1965 and a significant decline from 1967 through 1977. However, the long-term trend was negative. The catch rate for coho salmon increased, as shown in Figure 6. However, the trend in the catch rate for coho salmon in the Juneau derby was negative (Figure 7). This trend was probably due to increased numbers of anglers in the derby and crowding in good fishing areas.

The relative timing of chinook and coho salmon stocks fished upon by anglers in the Juneau area is reflected in Tables 5 and 6.

Variables in angler behavior have a decided effect upon these trends in the sport fishery although it is difficult to quantify their contribution. A direct influence can be seen in the effect of regulations. During the 1960, 1961, and 1962 seasons a minimum size of 66 cm (26 inches) fork length measure for chinook salmon was in effect. A significantly lower measure of catch rate is reflected in Table 5, as anglers were regulated to take only those chinook salmon greater than 66 cm (26 inches) than when the regulation was not in effect. Restrictive regulations were again imposed from May 17 to June 15, 1975, when the closed area shown in Figure 1 was in effect to protect the migration of chinook salmon. On July 30, 1975, regulations were implemented to restrict the take of chinook salmon to only those equal to or greater than 66 cm (26 inches) total length and to restrict the take of all salmon species to two per day. The latter restriction is reflected in Table 5 during weeks 13 through 21. In 1976 the closed area was again in effect from April 15 through June 14, and the take of chinook salmon was regulated to one chinook salmon per day that must be equal to or greater than 66 cm (26 inches) total length. These regulations are reflected in Table 5 as a low catch rate. In 1977 the closed area was in effect from April 15 through June 14, and the take of chinook salmon was one chinook salmon per day and that it must be equal to or greater than 71 cm (28 inches) total length measure.

The comparative summary of the Juneau salmon derby in Table 7 shows a marked increase in angler participation. As the number of anglers increased, more coho and pink salmon were entered. Some chum and sockeye salmon were also entered as the number of participating anglers steadily increased. Since 1973 the number of salmon entered has declined significantly. A second sample was initiated during the 1975 derby to sample that portion of the catch that was not entered for prizes but was taken home. This "take home" catch has increased in size during subsequent derbies. Reasons for the increase in the catch retained by the angler and not



Figure 4. Trend in mean chinook salmon/1,000 angler trips in the Juneau area sport fishery, 1960-1977.

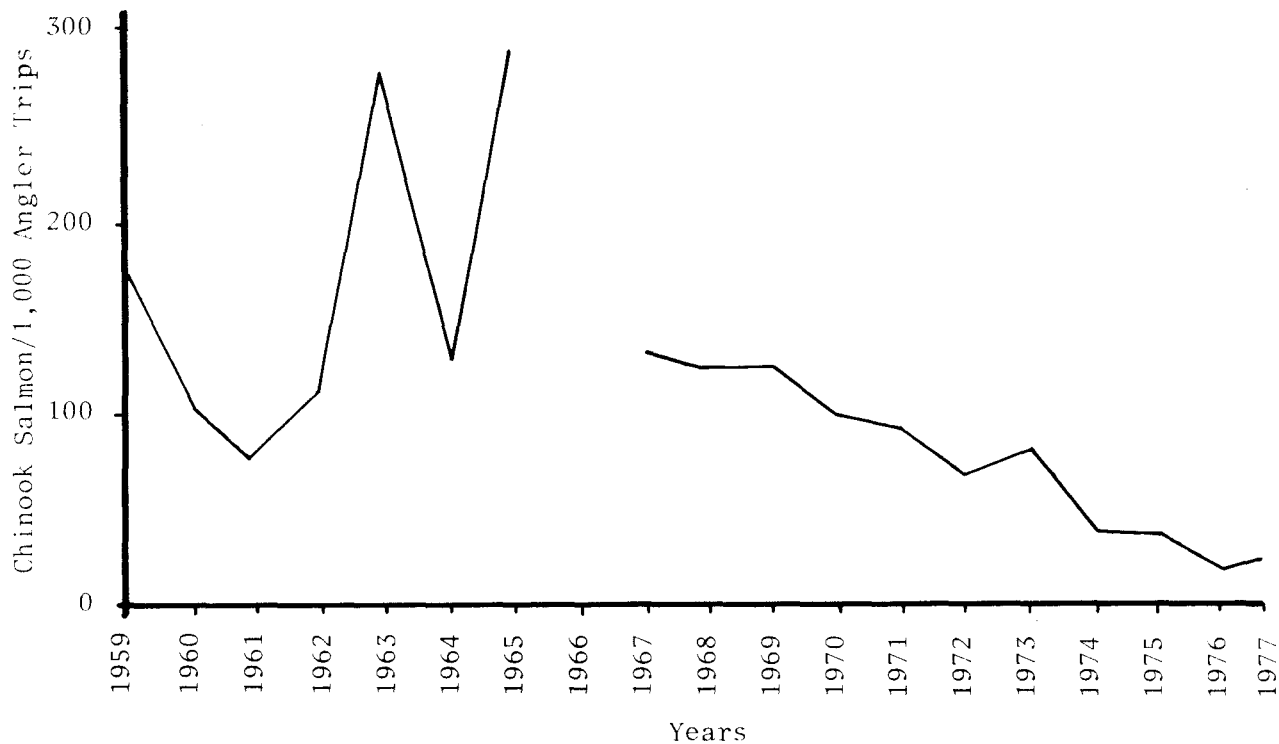


Figure 5. Trend in mean chinook salmon/1,000 angler trips during the Golden North Salmon Derby, 1959-1977.

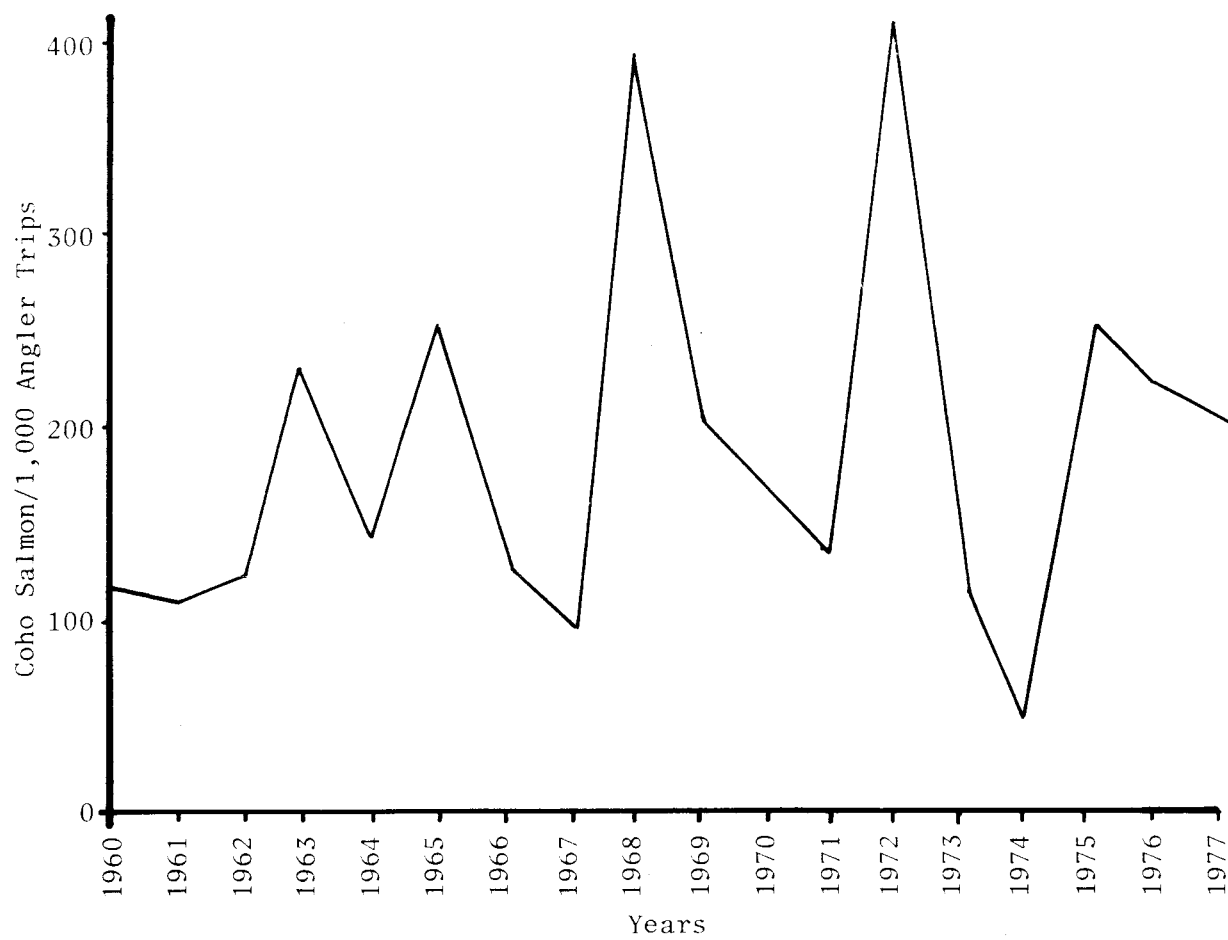


Figure 6. Trend in mean coho salmon/1,000 angler trips in the Juneau area sport fishery, 1960-1977.

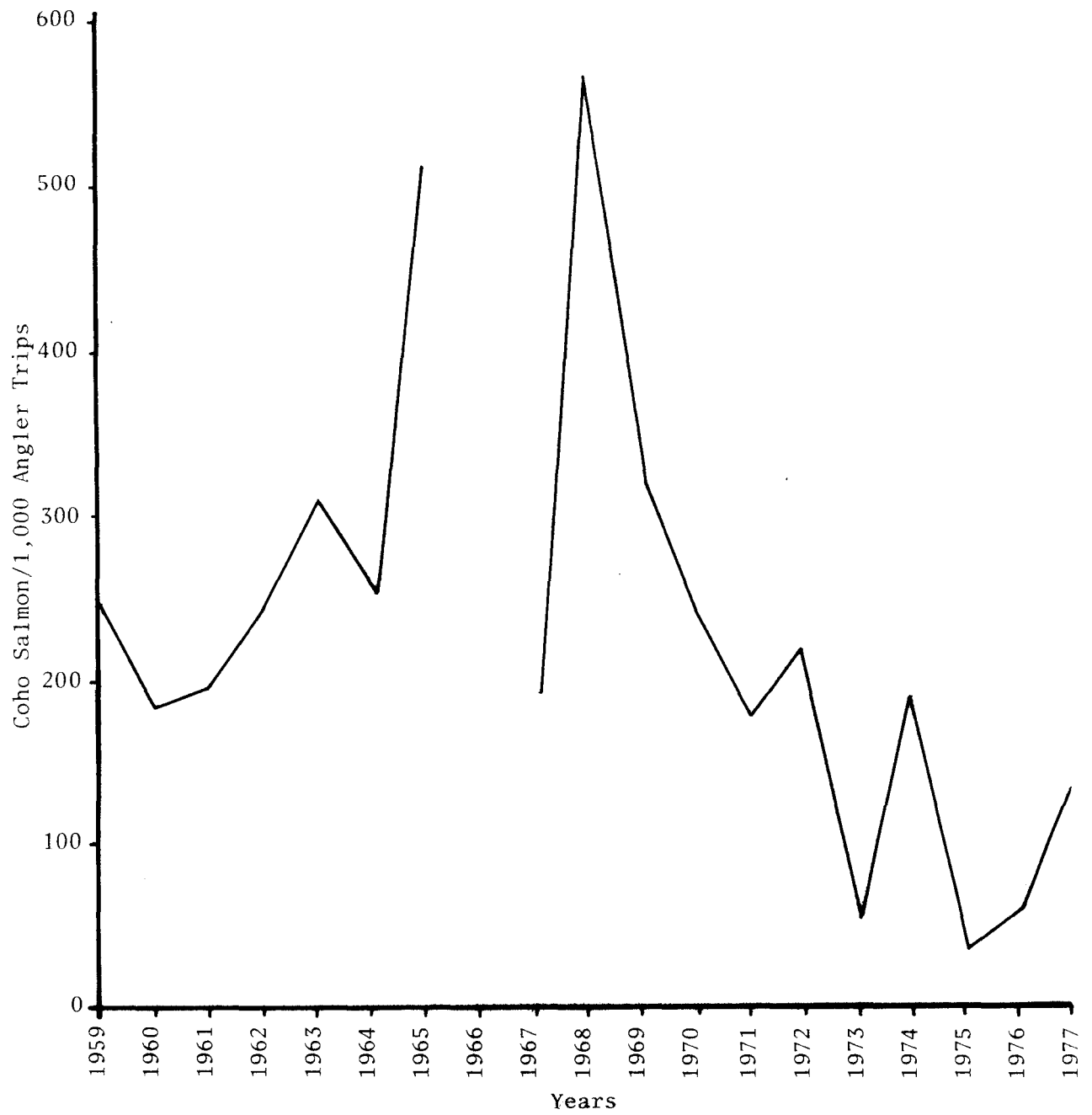


Figure 7. Trend in mean coho salmon/1,000 angler trips during the Golden North Salmon Derby, 1959-1977.

Table 5. Comparative chinook salmon kept per angler trip from Juneau area marine recreational fishery by weekly periods, 1960-1977.

Period	1 5/1- 5/7	2 5/8- 5/14	3 5/15- 5/21	4 5/22- 5/28	5 5/29- 6/4	6 6/5- 6/11	7 6/12- 6/18	8 6/19- 6/25	9 6/26- 7/2	10 7/3- 7/9	11 7/10- 7/16	12 7/17- 7/23	13 7/24- 7/30	14 7/31- 8/6	15 8/7- 8/13	16 8/14- 8/20	17 8/21- 8/27	18 8/28- 9/3	19 9/4- 9/10	20 9/11- 9/17	21 9/18- 9/24	22 9/25- 10/1	23 10/2- 10/8	24 10/9- 10/15	Seasonal Mean
1960	0.605	0.308	0.161	0.307	0.400	0.317	0.338	0.289	0.239	0.408	0.243	0.085	0.067	0.130	0.178	0.128	0.081	0.000	0.000						0.245
1961	0.193	0.232	0.291	0.248	0.250		0.180	0.108	0.164	0.140	0.145	0.095	0.069	0.222	0.111	0.057	0.038	0.000							0.150
1962		0.111	0.183	0.152	0.123	0.187	0.117	0.029	0.011	0.016	0.062	0.083	0.218	0.136	0.025	0.053	0.154	0.000							0.083
1963	0.462	0.436	0.320	0.574	0.412	0.451	0.247	0.232	0.383	0.221	0.244	0.208	0.050	0.248	0.092	0.099	0.060	0.144	0.085	0.043					0.232
1964	0.250	0.455	0.405	0.260	0.227	0.387	0.277	0.219	0.189	0.240	0.321	0.419	0.230	0.138	0.110	0.093	0.038	0.085							0.256
1965		0.261	0.281	0.370	0.313	0.240	0.183	0.079	0.126	0.126	0.200	0.147	0.133	0.170	0.076	0.060	0.069	0.054							0.164
1966	0.000	0.000	0.148	0.212	0.120	0.143	0.154	0.178	0.081	0.190	0.141	0.062	0.092	0.129	0.133	0.154	0.128	0.218							0.146
1967	0.029	0.053	0.157	0.138	0.250	0.181	0.121	0.217	0.164	0.147	0.117	0.125	0.082	0.099	0.068	0.043	0.069	0.109							0.145
1968					0.078	0.163	0.175	0.107	0.147	0.159	0.165	0.243	0.145	0.150	0.149	0.087	0.099								0.155
1969					0.111	0.165	0.265	0.096	0.152	0.214	0.078	0.182	0.116	0.139	0.113	0.119									0.146
1970					0.169	0.108	0.078	0.048	0.072	0.079	0.132	0.018	0.093	0.068	0.061	0.035	0.062								0.078
1971	0.000	0.119	0.095	0.264	0.272	0.177	0.215	0.111	0.159	0.116	0.122	0.171	0.196	0.093	0.115	0.230	0.083	0.151	0.065						0.065
1972					0.088	0.033	0.082	0.155	0.078	0.100	0.129		0.144	0.083	0.201	0.179	0.057	0.128	0.109						0.111
1973	0.535	0.094	0.115	0.130	0.151	0.122	0.190	0.113	0.212	0.198	0.186	0.301	0.140	0.106	0.060	0.047	0.040	0.160							0.130
1974		0.040	0.070	0.110	0.010	0.150	0.190	0.200	0.190	0.150	0.120	0.070	0.070	0.130	0.080	0.070	0.150	0.040	0.090						0.111
1975	0.090	0.211	0.034	0.147	0.205	0.139	0.165	0.055	0.086	0.097		0.152	0.039	0.030	0.030	0.038	0.017	0.008	0.027	0.013	0.021				0.059
1976	0.109	0.123	0.088	0.175	0.133	0.112	0.151	0.151	0.141	0.062	0.090	0.069	0.030	0.037	0.026	0.035	0.041	0.020	0.020	0.008	0.000	0.019	0.000	0.000	0.065
1977	0.073	0.075	0.133	0.187	0.078	0.148	0.126	0.118	0.057	0.049	0.111	0.052	0.051	0.044	0.003	0.006	0.020	0.006	0.027	0.005	0.000	0.000			0.080

Table 6. Comparative coho salmon kept per angler trip during Juneau area marine recreational fishery, 1960-1977.

Period	1 5/1- 5/7	2 5/8- 5/14	3 5/15- 5/21	4 5/22- 5/28	5 5/29- 6/4	6 6/5- 6/11	7 6/12- 6/18	8 6/19- 6/25	9 6/26- 7/2	10 7/3- 7/9	11 7/10- 7/16	12 7/17- 7/23	13 7/24- 7/30	14 7/31- 8/6	15 8/7- 8/13	16 8/14- 8/20	17 8/21- 8/27	18 8/28- 9/3	19 9/4- 9/10	20 9/11- 9/17	21 9/18- 9/24	22 9/25- 10/1	23 10/2- 10/8	24 10/9- 10/15	Seasonal Mean
1960	0.000	0.000	0.000	0.000	0.000	0.029	0.013	0.005	0.005	0.028	0.024	0.066	0.067	0.481	0.259	0.391	0.245	0.667	0.171						0.086
1961	0.000	0.000	0.000	0.000	0.000		0.000	0.007	0.020	0.027	0.180	0.174	0.219	0.444	0.111	0.341	0.437	0.400							0.101
1962		0.000	0.000	0.000	0.000	0.000	0.000	0.108	0.016	0.005	0.038	0.108	0.092	0.256	0.465	0.424	0.628	0.667							0.119
1963	0.000	0.000	0.000	0.000	0.000	0.019	0.043	0.018	0.063	0.135	0.197	0.242	0.550	0.476	0.621	0.832	0.648	0.568	0.729	0.702					0.300
1964	0.000	0.000	0.000	0.006	0.004	0.011	0.007	0.027	0.153	0.182	0.214	0.173	0.314	0.621	0.452	0.444	0.614	0.623							0.167
1965		0.000	0.000	0.000	0.120	0.020	0.038	0.029	0.065	0.178	0.272	0.426	0.313	0.564	0.555	0.527	0.511	0.514							0.256
1966	0.000	0.000	0.000	0.000	0.007	0.004	0.000	0.023	0.000	0.194	0.172	0.113	0.246	0.250	0.348	0.508	0.340	0.294							0.126
1967	0.000	0.000	0.000	0.000	0.002	0.000	0.010	0.051	0.035	0.110	0.075	0.107	0.066	0.258	0.454	0.256	0.394	0.217							0.096
1968					0.000	0.000	0.214	0.304	0.281	0.325	0.463	0.545	0.435	0.775	0.684	0.575	0.982								0.396
1969					0.000	0.002	0.051	0.037	0.078	0.122	0.044	0.182	0.214	0.402	0.479	0.278									0.152
1970						0.017	0.006	0.008	0.009	0.150	0.103	0.206	0.219	0.207	0.367	0.377	0.401	0.383							0.164
1971	0.000	0.000	0.000	0.000	0.004	0.013	0.015	0.031	0.049	0.060	0.183	0.145	0.299	0.392	0.404	0.351	0.256	0.374	0.848						0.134
1972					0.000	0.000	0.089	0.302	0.358	0.361	0.392		1.235	0.592	0.479	0.504	0.332	0.698	0.465						0.414
1973				0.002	0.005	0.036	0.025	0.029	0.054	0.145	0.115	0.086	0.098	0.191	0.268	0.254	0.427	0.392							0.118
1974		0.000	0.012	0.005	0.000	0.012	0.018	0.071	0.198	0.281	0.366	0.346	0.478	0.469	0.466	0.502	0.604	0.401	0.723						0.111
1975	0.000	0.000	0.000	0.000	0.018	0.021	0.010	0.010	0.116	0.140		0.185	0.402	0.215	0.315	0.669	0.378	0.292	0.407	0.417	0.303				0.252
1976	0.000	0.000	0.000	0.000	0.014	0.004	0.023	0.034	0.169	0.130	0.216	0.191	0.293	0.264	0.143	0.501	0.494	0.320	0.313	0.351	0.489	0.126	0.052	0.000	0.225
1977	0.000	0.000	0.000	0.012	0.000	0.003	0.023	0.104	0.214	0.223	0.371	0.432	0.298	0.374	0.260	0.318	0.314	0.238	0.270	0.176	0.129	0.028			0.175

Table 7. Comparison of Golden North Salmon Derby angler effort and catch estimates, 1959-1977.

Year	Dates Held	Angler Validations	Chinook Salmon		Coho Salmon		Pink Salmon		Chum Salmon		Sockeye Salmon	
			Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home
1959	7/24-7/26	3,511	599		862		0					
1960	7/29-7/31	3,479	361		650		19					
1961	n/a	2,818	221		551		22					
1962	7/27-7/29	2,033	226		490		7		10			
1963	7/26-7/28	2,229	617		695		115		12			
1964	7/31-8/2	4,940	624		1,246		297		5			
1965	7/23-7/25	1,598	454		821		16		4			
1966	7/22-7/24	n/a	795		290		92		33			
1967	7/28-7/30	3,228	431		633		144		27			
1968	8/2 -8/4	3,350	424		1,908		382		6			
1969	n/a	3,825	477		1,225		603		26			
1970	n/a	3,800	375		919		124		9			
1971	7/16-7/18	7,434	682		1,331		409		226			
1972	7/21-7/23	8,199	528		1,817		328		123			
1973	7/20-7/22	7,915	637		449		278		34			
1974	7/26-7/28	7,714	291		1,526		226		24			
1975	7/18-7/20	7,847	276	184	315	354	174	531	15	14	0	0
1976	7/23-7/25	8,466	136	167	536	1,135	58	96	4	12	1	0
1977	8/5 -8/7	8,762	161	355	1,206	2,419	259	55	28	1	1	0

Table 7. (Cont.) Comparison of Golden North Salmon Derby angler effort and catch estimates, 1959-1977.

Year	Pacific Halibut		Dolly Varden		Rockfish		Pacific Cod		Total		Total Catch
	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	Entered	Taken Home	
1959									1,461		
1960									1,030		
1961									794		
1962									733		
1963									1,439		
1964									2,172		
1965									1,295		
1966	35								1,215		
1967									1,235		
1968									2,720		
1969									2,331		
1970									1,427		
1971									2,648		
1972									2,796		
1973									1,398		
1974									2,067		
1975	0	142	0	21	0	57	0	14	780	1,317	2,037
1976	0	36	0	37	0	107	0	0	735	1,590	2,325
1977	0	202	0	0	0	0	0	0	1,655	3,032	4,687

entered for prizes are probably numerous and peculiar to each angler. With the increased angler demand for salmon, particularly chinook salmon, they have increased in value to an angler such that if it is not of sufficient size to guarantee him a prize, he will not enter it in the derby.

The decline in the catch rate of chinook and coho salmon by anglers during the derby, as reflected in Figures 5 and 7 and in Table 7, can be attributed to the increased number of participating anglers and the resulting crowding of popular fishing locations. With its prize incentive the derby attracts many inexperienced anglers who have a considerable effect on the low catch rate.

Juneau Area Roadside Recreational Harvest Study:

Along the Juneau area roadside an estimated 10,144 anglers spent 35,227.25 hours to catch 8,012 Dolly Varden, Salvelinus malma (Walbaum); 1,474 pink, 690 coho, 550 sockeye, and 22 chinook salmon; 1,345 cutthroat, Salmo clarki Richardson, 48 rainbow, Salmo gairdneri Richardson, and 892 brook trout, Salvelinus fontinalis (Mitchill); 489 rockfish; 24 flounder, Pleuronectidae spp.; and 16 walleye pollock, Theragra chalcogramma (Pallas) (Table 8). The mean catch per angler trip was 0.81 for Dolly Varden; 0.15 for pink, 0.07 for coho, 0.06 for sockeye, and 0.00+ for chinook salmon; 0.14 for cutthroat, 3.00 for rainbow, and 3.44 for brook trout; 0.05 for rockfish; 0.00+ for flounder; and 0.00+ for walleye pollock (Table 9).

Based upon the study data no marked salmon were estimated to have been caught by roadside anglers in the Juneau area.

After testing the three data sets the angler effort and catch estimates were calculated based upon counts, the completed trip interviews, and the returned questionnaires. In evaluating the mean catch rate, time expended and the associated standard deviations for each data set, the incompleting trip interviews were discarded because the difference between them and the other data sets was too great to statistically infer they were all from the same population.

In using the two counting procedures, the time necessary to count anglers fishing alone was found to be a probable source of error. The mean elapsed time for a completed fishing trip was 2.65 hours; whereas, the time it took a technician to complete a count cycle was 3.5 to 4.0 hours. In addition, no interviewed parties reported fishing in an area long enough to be counted twice. The effect of this phenomenon is that some anglers could have conducted a whole trip and not have been counted which would result in estimates of angler effort and catch that would be low.

Wrangell Area Marine Recreational Harvest Study:

In the Wrangell area an estimated 1,157 anglers took 5,742.25 hours to catch chinook salmon during the study period (Table 10). The estimates of catch per angler trip for chinook salmon are presented in Table 11.

Table 8. Estimate of angler effort and catch by species in the Juneau area roadside recreational fishery,
May 1 - September 5, 1977.

Period	1 5/1- 5/14	2 5/15- 5/28	3 5/29- 6/11	4 6/12- 6/25	5 6/26- 7/9	6 7/10- 7/23	7 7/24- 8/6	8 8/7- 8/20	9 8/21- 9/3	10 9/4- 9/5	Season Total
Angler Trips	440	768	660	1,738	1,269	1,418	1,804	1,226	715	142	10,144
Angler Hours	1,190	2,380.75	2,086	5,804.75	3,887.5	5,820.25	6,123.25	4,110.25	3,006	818.5	35,227.25
Dolly Varden	130	586	312	96	1,967	591	1,031	1,667	1,266	366	8,012
Pink Salmon	0	0	0	0	4	222	1,174	74	0	0	1,474
Cutthroat Trout	168	27	277	152	44	24	0	80	447	126	1,345
Brook Trout	0	0	0	0	249	183	131	50	173	106	892
Coho Salmon	0	0	0	0	194	83	114	229	0	70	690
Sockeye Salmon	0	0	20	530	0	0	0	0	0	0	550
Rockfish	0	0	0	0	0	489	0	0	0	0	489
Rainbow Trout	0	0	0	42	0	6	0	0	0	0	48
Flounder	0	0	0	0	0	24	0	0	0	0	24
Chinook Salmon	0	0	0	9	7	2	4	0	0	0	22
Walleye Pollock	0	0	0	0	0	0	16	0	0	0	16

Table 9. Estimate of Juneau area roadside recreational catch per unit of effort by fish species,
May 1 - September 5, 1977.

Period	1 5/1- 5/14	2 5/15- 5/28	3 5/29- 6/11	4 6/12- 6/25	5 6/26- 7/9	6 7/10- 7/23	7 7/24- 8/6	8 8/7- 8/20	9 8/21- 9/3	10 9/4- 9/5	Season Mean
Sample Size (Anglers Contacted)	33	77	52	37	52	76	93	48	22	3	493
Dolly Varden/ Angler Trip	0.32	0.76	0.47	0.06	1.67	0.43	0.60	1.37	1.81	2.77	0.81
Pink Salmon/ Angler Trip	0.00	0.00	0.00	0.00	0.00+	0.16	0.68	0.06	0.00	0.00	0.15
Cutthroat Trout/ Angler Trip	0.42	0.04	0.42	0.09	0.04	0.18	0.00	0.07	0.64	0.95	0.14
Brook Trout/ Angler Trip	0.00	0.00	0.00	0.00	2.80	3.52	1.62	8.33	10.00	10.00	3.44
Coho Salmon/ Angler Trip	0.00	0.00	0.00	0.00	0.16	0.06	0.07	0.19	0.00	0.53	0.07
Sockeye Salmon/ Angler Trip	0.00	0.00	0.03	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Rockfish/ Angler Trip	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.05
Rainbow Trout/ Angler Trip	0.00	0.00	0.00	3.00	0.00	3.00	0.00	0.00	0.00	0.00	3.00
Flounder/ Angler Trip	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00+
Chinook Salmon/ Angler Trip	0.00	0.00	0.00	0.01	0.01	0.00+	0.00+	0.00	0.00	0.00	0.00+
Walleye Pollock/ Angler Trip	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00+

Table 10. Estimate of angler effort and catch of chinook salmon during Wrangell area marine recreational fishery, April 7 - May 20, 1977.

<u>Period</u>	<u>1</u> <u>4/7-</u> <u>4/9</u>	<u>2</u> <u>4/10-</u> <u>4/16</u>	<u>3</u> <u>4/17-</u> <u>4/23</u>	<u>4</u> <u>4/24-</u> <u>4/30</u>	<u>5</u> <u>5/1-</u> <u>5/7</u>	<u>6</u> <u>5/8-</u> <u>5/14</u>	<u>7</u> <u>5/15-</u> <u>5/20</u>	<u>Seasonal</u> <u>Total</u>
Angler Trips	10	23	191	214	47	359	313	1,157
Angler Hours	67	79	896	860	228	1,556.75	2,055.3	5,742.25
Chinook Salmon	2	5*	54*	52*	35	126	86	360

*During period 2, 3, and 4 interim data for unsuccessful angler parties was not recorded. Estimates of chinook caught for these periods were based on the mean catch rate for the periods 1, 5, 6 and 7.

Table 11. Wrangell area recreational chinook salmon catch per angler trip, April 7 - May 22, 1977.

<u>Period</u>	<u>1</u> <u>4/7-</u> <u>4/9</u>	<u>2</u> <u>4/10-</u> <u>4/16</u>	<u>3</u> <u>4/17-</u> <u>4/23</u>	<u>4</u> <u>4/24-</u> <u>4/30</u>	<u>5</u> <u>5/1-</u> <u>5/7</u>	<u>6</u> <u>5/8-</u> <u>5/14</u>	<u>7</u> <u>5/15-</u> <u>5/20</u>	<u>Seasonal</u> <u>Mean</u>
Sample size (Anglers Contacted)	3	5	24	17	8	84	104	245
Chinook Salmon/ Angler Trip	0.2	0.087*	0.283*	0.243*	0.745	0.351	0.275	0.311

*During period 2, 3, and 4 intermen data for unsuccessful angler parties was not recorded. Esimates of chinook caught for these periods were based on the mean catch rate for the periods 1, 5, 6 and 7.

On May 24, by emergency order, the Department closed the study area to sport fishing. The study was subsequently terminated prior to the effective closure date.

During periods 2, 3, and 4 the technician sampling the fishery did not record interviews with unsuccessful angler parties. As a representative sample of angler catch success was not available for analysis, an unbiased estimate of catch and catch rate for these periods could not be calculated from the successful angler data. The estimate of chinook caught for these periods was derived based upon the mean catch rate for periods 1, 5, 6 and 7.

Wrangell King Salmon Derby:

The Special Derby Days were sampled in the study area May 21 and May 22, 1977. During the derby an estimated 209 anglers took 1,427.75 hours to catch 33 chinook salmon. Based upon sampled chinook salmon no marked chinook salmon were caught during the study.

North Behm Canal Area Marine Recreational Harvest Study:

Anglers staying at the Bell Island Resort made 1,958 trips and spent an estimated 6,353 hours to catch 474 chinook, 101 coho, 447 pink, and 4 chum salmon during the study period (Table 12). The mean catch per angler trip for Bell Island anglers was 0.242 for chinook, 0.052 for coho, 0.228 for pink, and 0.002 for chum salmon (Table 13).

Those anglers staying at the Yes Bay Lodge made 1,019 trips and spent 4,373.5 hours to catch 120 chinook, 30 coho, 167 pink, and 6 chum salmon. In addition to salmon they also caught 18 Pacific halibut, 6 flounder, 119 rockfish, and 24 cod, Gadidae spp. (Table 14). The mean catch by species for angler trip was 0.118 for chinook, 0.029 for coho, 0.164 for pink, and 0.006 for chum salmon; 0.018 for Pacific halibut; 0.006 for flounder; 0.117 for rockfish; and 0.024 for cod (Table 15).

No marked salmon were caught in the fishery based upon sample data.

Ketchikan Area Marine Recreational Harvest Study:

Anglers fishing in the Ketchikan area made an estimated 29,878 trips and spent 154,985.25 hours to catch an estimated 1,239 chinook, 1,453 coho, 11,904 pink, 76 chum, and 23 sockeye salmon; 6 trout and char; 569 Pacific halibut; and 8,311 fishes of other species (Table 16). The mean catch by species for angler trip for anglers fishing in the Ketchikan area was 0.041 for chinook, 0.049 for coho, 0.398 for pink, 0.003 for chum, and 0.001 for sockeye salmon; 0.019 for Pacific halibut, and 0.278 for fishes of other species (Table 17).

No salmon observed during the sampling had any tags or marks. Therefore no marked salmon were estimated to make a contribution to the Ketchikan area recreational harvest.

Table 12. Summary of angler effort and catch success during Bell Island area marine recreational fishery,
May 26 - August 31, 1977.

Period	1 5/26- 5/28	2 5/29- 6/4	3 6/5- 6/11	4 6/12- 6/18	5 6/19- 6/25	6 6/26- 7/2	7 7/3- 7/9	8 7/10- 7/16	9 7/17- 7/23	10 7/24- 7/30	11 7/31- 8/6	12 8/7- 8/13	13 8/14 8/20	14 8/21- 8/27	15 8/28- 8/31	Seasonal Total
Angler Trips	19	14	82	189	109	75	161	255	257	178	131	160	182	135	11	1,958
Angler Hours	63.75*	43*	307.75*	618.25	383	234.25	434.75	816.5	1,030.75	568	421.25	465.5	496.75	425.5	44	6,353
Chinook	4	6	31	48	54	34	52	28	46	75	31	26	28	11	0	474
Coho	0	0	0	0	0	0	1	6	7	4	4	8	23	37	11	101
Pink	0	0	0	0	0	0	11	85	178	63	40	53	16	1	0	447
Chum	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	4
Total Salmon	4	6	31	49	54	34	65	120	232	142	75	87	67	49	11	1,026

*Estimated based upon reported effort during other angler trips.

Table 13. Summary of Bell Island area recreational catch per unit of effort by fish species, May 2 - August 31, 1977.

Period	1 5/26- 5/28	2 5/29- 6/4	3 6/5- 6/11	4 6/12- 6/18	5 6/19- 6/25	6 6/26- 7/2	7 7/3- 7/9	8 7/10- 7/16	9 7/17- 7/23	10 7/24- 7/30	11 7/31- 8/6	12 8/7- 8/13	13 8/14- 8/20	14 8/21- 8/27	15 8/28- 8/31	Seasonal Mean
Sample Size (Anglers Contacted)	19	14	82	189	109	75	161	255	257	178	131	160	182	135	11	1,958
Chinook Salmon/ Angler Trip	0.211	0.429	0.378	0.254	0.495	0.453	0.323	0.120	0.179	0.421	0.237	0.162	0.154	0.081	0.000	0.242
Coho Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.024	0.027	0.022	0.031	0.050	0.126	0.274	1.000	0.052
Pink Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.000	0.000	0.068	0.333	0.693	0.354	0.305	0.331	0.088	0.007	0.000	0.228
Chum Salmon/ Angler Trip	0.000	0.000	0.000	0.005	0.000	0.000	0.006	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.002

Table 14. Summary of angler effort and catch success during Yes Bay area marine recreational fishery, June 2 - August 31, 1977.

<u>Period</u>	<u>1</u> <u>6/2-</u> <u>6/4</u>	<u>2</u> <u>6/5-</u> <u>6/11</u>	<u>3</u> <u>6/12-</u> <u>6/18</u>	<u>4</u> <u>6/19-</u> <u>6/25</u>	<u>5</u> <u>6/26-</u> <u>7/2</u>	<u>6</u> <u>7/3-</u> <u>7/9</u>	<u>7</u> <u>7/10-</u> <u>7/16</u>	<u>8</u> <u>7/17-</u> <u>7/23</u>	<u>9</u> <u>7/24-</u> <u>7/30</u>	<u>10</u> <u>7/31-</u> <u>8/6</u>	<u>11</u> <u>8/7-</u> <u>8/13</u>	<u>12</u> <u>8/14-</u> <u>8/20</u>	<u>13</u> <u>8/21-</u> <u>8/27</u>	<u>14</u> <u>8/28-</u> <u>8/31</u>	<u>Seasonal</u> <u>Total</u>
Angler Trips	28	125	82	78	45	49	80	15	20	102	103	131	110	51	1,019
Angler Hours	111.75	525.5	348.75	290	165	191	310.75	47	68.75	590	573.75	455	488.5	207.75	4,373.5
Chinook	6	39	19	16	5	3	6	4	1	1	9	6	3	2	120
Coho	0	0	0	0	0	0	1	1	0	4	3	3	15	3	30
Pink	0	0	0	0	0	0	14	15	5	53	73	2	5	0	167
Chum	0	0	1	1	1	0	0	0	0	0	0	2	1	0	6
Total Salmon	6	39	20	17	6	3	21	20	6	58	85	13	24	5	323
Pacific Halibut	0	1	3	3	0	2	0	0	0	2	1	0	1	5	18
Flounder*	0	0	1	0	0	0	3	0	2	0	0	0	0	0	6
Rockfish**	2	48	0	0	0	16	7	0	4	12	13	15	2	0	119
Cod***	2	0	2	0	0	1	10	0	0	0	6	2	1	0	24

*Pleuronectidae spp.

**Sebastes spp.

***Gadidae spp.

Table 15. Summary of Yes Bay area recreational catch per unit of effort by fish species, June 2 - August 31, 1977.

Period	1 6/2- 6/4	2 6/5- 6/11	3 6/12- 6/18	4 6/19- 6/25	5 6/26- 7/2	6 7/3- 7/9	7 7/10- 7/16	8 7/17- 7/23	9 7/24- 7/30	10 7/31- 8/6	11 8/7- 8/13	12 8/14- 8/20	13 8/21- 8/27	14 8/28- 8/31	Seasonal Mean
Sample Size (Anglers Contacted)	28	125	82	78	45	49	80	15	20	102	103	131	110	51	1,019
Chinook Salmon/ Angler Trip	0.214	0.312	0.232	0.205	0.111	0.102	0.075	0.267	0.050	0.010	0.087	0.046	0.027	0.039	0.118
Coho Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.067	0.000	0.039	0.029	0.023	0.136	0.059	0.029
Pink Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.000	0.000	0.175	1.000	0.250	0.520	0.709	0.015	0.045	0.000	0.164
Chum Salmon/ Angler Trip	0.000	0.000	0.012	0.013	0.222	0.020	0.000	0.000	0.000	0.000	0.000	0.015	0.009	0.000	0.006
Pacific Halibut/ Angler Trip	0.000	0.008	0.037	0.038	0.000	0.000	0.000	0.000	0.000	0.020	0.010	0.000	0.009	0.098	0.018
Flounder*/ Angler Trip	0.000	0.000	0.012	0.000	0.000	0.000	0.038	0.000	0.100	0.000	0.000	0.000	0.000	0.000	0.006
Rockfish**/ Angler Trip	0.071	0.384	0.000	0.000	0.000	0.000	0.088	0.000	0.200	0.118	0.126	0.114	0.018	0.000	0.117
Cod***/ Angler Trip	0.071	0.000	0.024	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.058	0.015	0.009	0.000	0.024
*Pleuronectidae spp.															
**Sebastes spp.															
***Gadidae spp.															

Table 16. Estimate of angler effort and catch success during Ketchikan area marine recreational fishery, May 15 - September 3, 1977.

Period	1* 5/15- 5/28	2* 5/29- 6/11	3* 6/12- 6/25	4 6/26- 7/9	5 7/10- 7/23	6 7/24- 8/6	7 8/7- 8/20	8 8/21- 9/3	Seasonal Total
Angler Trips	2,554	2,175	2,919	3,485	7,069	4,188	4,320	3,168	29,878
Angler Hours	14,062	8,162.25	16,847.5	18,069.25	37,356.25	22,184.75	20,431.75	17,871.5	154,985.25
Chinook	179	301	270	140	115	124	63	47	1,239
Coho	0	0	58	12	371	155	231	626	1,453
Pink	0	0	0	221	5,705	4,141	1,254	583	11,904
Chum	0	0	29	0	47	0	0	0	76
Sockeye	0	0	0	0	23	0	0	0	23
Total Salmon	179	301	357	373	6,261	4,420	1,548	1,256	14,695
Trout and Char	0	0	0	6	0	0	0	0	6
Pacific Halibut	96	0	29	180	117	6	24	117	569
Other Species**	1,240	515	489	1,514	1,559	278	1,001	1,715	8,311

*Special Derby Days excluded.

**Other species of families Gadidae, Scorpaenidae, Cottidae, and Pleuronectidae.

Table 17. Ketchikan area recreational catch per unit of effort by fish species, May 15 - September 3, 1977.

<u>Period</u>	<u>1*</u> 5/15- 5/28	<u>2*</u> 5/29- 6/11	<u>3*</u> 6/12- 6/25	<u>4</u> 6/26- 7/9	<u>5</u> 7/10- 7/23	<u>6</u> 7/24- 8/6	<u>7</u> 8/7- 8/20	<u>8</u> 8/21- 9/3	<u>Seasonal</u> <u>Mean</u>
Sample Size (Anglers Contacted)	224	94	215	251	591	544	310	217	2,446
Chinook Salmon/ Angler Trip	0.070	0.138	0.092	0.040	0.016	0.030	0.015	0.015	0.041
Coho Salmon/ Angler Trip	0.000	0.000	0.020	0.003	0.052	0.037	0.053	0.198	0.049
Pink Salmon/ Angler Trip	0.000	0.000	0.000	0.063	0.807	0.989	0.290	0.184	0.398
Chum Salmon/ Angler Trip	0.000	0.000	0.010	0.000	0.007	0.000	0.000	0.000	0.003
Sockeye Salmon/ Angler Trip	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001
Trout and Char/ Angler Trip	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Pacific Halibut/ Angler Trip	0.038	0.000	0.010	0.052	0.017	0.001	0.006	0.037	0.019
Other Species** / Angler Trip	0.486	0.237	0.168	0.434	0.221	0.066	0.232	0.541	0.278

*Special Derby Days excluded.

**Other species of families Gadidae, Scorpaenidae, Cottidae, and Pleuronectidae.

Ketchikan King Salmon Derby:

The Ketchikan King Salmon Derby was conducted on May 28, 29, and 30 and June 4, 5, 11, and 12, 1977. An estimated 3,808 anglers fished during the 7-day derby. Derby participants entered 275 chinook salmon for various prize categories. None of the salmon examined in this sample had any marks or tags.

During the derby anglers were also interviewed to determine if any of the fish they caught were not entered in the derby. From the "take home" sample an estimated 198 chinook, 6 coho, and 1 chum salmon; 105 trout and char; 109 Pacific halibut; and 1,260 fishes of other species were kept and not entered in the derby. None of the salmon examined in this sample had any marks or tags.

DISCUSSION

Juneau Area Marine Recreational Harvest Study:

The contribution of facility-reared chinook and coho salmon has fluctuated considerably since 1975. The contribution of facility-reared chinook salmon, although it has increased in number from 48 in 1976 to 78 in 1977, has declined in contribution to the seasonal catch from 2.2% to 1.8%. The contribution of facility-reared coho salmon has shown an increase of 152 (1.6%) of 9,459 coho salmon caught in 1977 over the catch of 45 (0.6%) of 7,646 coho salmon caught in 1976 (Robards, 1977). However, that contribution is minor compared to 286 (5.3%) of 5,394 coho salmon caught in the 1975 season (Robards, 1976).

Coho salmon marked with only an adipose fin clip have continued to complicate the determination of their specific origin. Without the secondary mark or tag their specific origin is unclear. It is entirely probable that they may have been members of another marked group or part of a group that strayed from another area and subsequently lost their second mark or tag.

The season catch estimates (Table 18) show a significant increase, with considerable variation from year to year, in the catch of a particular species and in comparing the catch of one species to another. Such considerations as regulations, angler preference, knowledge of a species, weather, access to a fishery, abundance of a species, and distribution of that species have considerable influence upon the catch success of an angling party. In addition to the abundance of a fish species, angler preference and knowledge of a particular species are important considerations in a mixed species fishery such as the Juneau area marine sport fishery. This phenomenon is well discussed in the literature of other mixed species fisheries (Grosslein, 1957; Neuhold and Lu, 1957; Lambou and Stern, 1959; von Geldern, 1972; and von Geldern and Tomlinson, 1973). It arises from the fact that anglers exercise considerable control over the species composition of their catch by any one or a combination of the following methods:

Table 18. Comparative seasonal angler effort and catch for Juneau area marine recreational fishery,
May 1 - September 3, 1960-1977.

<u>Year</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
Angler Trips	4,934	6,550	6,220	9,787	10,864	9,863	11,598	11,059	21,095	15,812
Angler Hours	24,496	27,376	32,001	49,059	51,266	46,614	58,694	53,370	89,203	60,192
Chinook	1,065	828	520	2,234	2,780	1,634	2,726	1,599	3,075	2,141
(Chinook ≥66 cm)	(905)	(708)	(499)	(1,704)	(1,954)	(1,259)	(1,797)	(1,097)	(2,360)	(1,331)
Coho	425	664	743	2,940	1,813	2,526	1,462	1,063	8,363	2,403
Pink	47	55	35	211	164	45	190	139	1,595	1,175
Chum	8	19	29	39	0	14	27	35	36	24
Sockeye	0	0	0	0	0	5	41	5	63	0
Total Salmon	1,545	1,566	1,327	5,424	4,757	4,224	4,446	2,841	13,132	5,743
Trout and Char	139	3	64	270	295	115	280	379	897	362
Pacific Halibut	433	13	1,254	1,332	1,029	1,523	3,105	1,930	3,354	3,312
Other Species	86	0	152	159	164	60	113	24	282	184

Table 18. (Cont.) Comparative seasonal angler effort and catch for Juneau area marine recreational fishery, May 1 - September 3, 1960-1977.

<u>Year</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>Mean</u>
Angler Trips	34,328	22,790	15,150	21,773	20,766	18,004	30,591	44,240	17,524
Angler Hours	127,349	98,792	58,473	93,304	112,865	91,527	156,793	219,174	80,586
Chinook	2,886	3,735	1,742	2,604	2,326	1,277	2,184	3,302	2,147
(Chinook ≥ 66 cm)	(2,299)	(2,328)	(912)	(1,465)	(1,808)	(987)	(2,184)	(3,302)	(1,606)
Coho	5,635	3,052	6,274	2,576	5,622	4,541	6,873	8,635	3,645
Pink	1,613	435	575	909	1,110	824	446	1,997	642
Chum	72	380	224	75	89	108	167	123	82
Sockeye	10	8	0	0	32	21	146	1,243	87
Total Salmon	10,216	7,610	8,815	6,164	9,179	6,771	9,816	11,998	6,062
Trout and Char	1,479	922	2,147	1,319	742	803	205	1,334	653
Pacific Halibut	4,043	1,450	1,833	3,098	1,366	756	915	1,026	1,765
Other Species	331	143	30	540	738	259	355	400	204

1. The angler can select a particular fishing site known to be frequented by a desired species.
2. An angling method, i.e., type of tackle, bait, handling of boat, and particular depth zone is selected that is efficient in catching the desired species.
3. The actual disposition of fish caught is directly influenced by the angler's preference. Those fish retained must then be of a desired species and size, and all undesirable species will be returned to the water. Species caught of an undesirable size to the angler or not in compliance with regulations would also be returned to the water.

Therefore, using catch and effort of all anglers fishing in such a fishery as an index of fishing quality of a single species could produce an inaccurate measure of angling quality for an individual species.

In evaluating the impact of the variables affecting the participation of an angler in a sport fishery, only those anglers using relatively efficient angling methods for a species should actually be included in calculating a catch rate estimate for that species. This is argued by von Geldern and Tomlinson (1973).

Often the more knowledgeable and productive anglers achieve commercial status in order to further benefit from their angling activity. Becoming a commercial fisherman and utilizing sport gear or hand gurdies give him added flexibility in becoming sport or commercial at his discretion. The commercial status benefits the fisherman with financial gain from his efforts. As these more productive sport fishermen become commercial, their effort and catch is not included in the presentation of sport catch, leaving a remaining population of anglers of varying knowledge, experience, species preference, and access to the fishery.

In previous years these "relatively efficient angling methods" have not been completely described for the Juneau area fishery and applied solely to a particular species, but instead the reported angler effort has been summed and applied to all species of fish caught and kept by anglers. This method of estimating angling quality would result in low estimates for different species for which angling techniques vary and significantly lower estimates for less desired species.

Consistent with their species preference, anglers will seek their preferred species and will often hook and release undesirable species, depending upon their catch success of the species for which they are angling. In a mail survey of anglers Schmidt and Robards (1974) reported the most preferred species in the Juneau area was chinook salmon, with coho salmon second; although some ranked coho salmon first. The other three salmon species were ranked as pink salmon, third; chum salmon, fourth; and sockeye salmon, fifth. However, there was considerable disagreement in ranking of these three species by responding anglers. Trout, Dolly Varden, Pacific halibut, and other species were not considered in the rating. The findings of this poll would probably vary from one time period to

another and certainly from angler to angler. Therefore, a poor estimate of angling quality could result if only those fish that were retained in the angler's creel were utilized in calculation of angling quality. This behavior is thought to be infrequent among anglers with salmon due to their popularity in the fishery. However, with some members of the families Gadidae, Scorpaenidae, Cottidae, and Pleuronectidae that are regarded as undesirable it is a common occurrence.

Species preference has changed for many anglers due to the depleted stocks of chinook salmon in the Juneau area. Other species have been in increasing demand, particularly the coho salmon. Its popularity is probably due to its well-known tenacity while on the hook. Since the 1963 season anglers have shown an increasing preference for coho salmon (Table 18). Pink salmon have become a more important species in the angler's catch since 1962; however, they are not quite as desired as the chinook and coho salmon. This is probably due to their smaller size. The chum salmon has also become more desired by anglers but is not often caught on sport tackle. The number of sockeye salmon in the sport catch has increased considerably over previous years. This is due largely to the highly successful fishery that has developed at the mouth of Auke Creek. Dolly Varden are often taken as incidental catch to salmon, and infrequently a sea-run rainbow trout (steelhead) or cutthroat trout may be caught.

Pacific halibut is preferred to salmon by some anglers. However, since 1970 there has been a marked decline in the sport catch of Pacific halibut (Table 18). This trend is probably due to the increasing commercial value of this species.

Juneau Area Roadside Recreational Harvest Study:

In evaluating the findings of the harvest studies conducted in 1972 with that in 1977 some changes are readily apparent (Schmidt and Robards, 1973). Although the 1972 study was only conducted from June 1 through September 3, it reported more angler effort, 10,105 angler trips, compared to the 1977 study which was conducted May 1 through September 5 and reported 10,144 angler trips. In addition, some changes in the number of each species in the catch were also apparent.

In considering the time frame, June 1 through September 3, there was a significant decline in the fishery for Dolly Varden. The catch of Dolly Varden has declined from 9,152 with a mean catch per angler trip of 0.91 in 1972 to 6,930 with a mean catch per angler trip of 0.79 in 1977. This represents a 24% decline in the number of Dolly Varden taken by anglers in comparing the same period for both years.

The catch of pink salmon has increased substantially from the 1972 to 1977 season, from 583 to 1,474. This increase reflects a shift in species preference and a marked increase in angler effort on estuarine areas contiguous to the Juneau area road system.

In addition, the catch of cutthroat trout has increased from 269 in 1972 to 980 in 1977. The increase is probably due in part to the decline in effort on Dolly Varden and increased angler effort in estuarine areas.

The catch of sockeye salmon has shown a large increase from 56 in 1972 to 550 in 1977. This increase has been due to increased popularity of sockeye salmon, particularly in the Auke Bay area, as anglers appear to have gained greater knowledge and experience in fishing for this species.

Another species of increased popularity is the coho salmon. From 1972 to 1977 the catch of coho salmon has increased from 112 to 620. The extension of the Juneau area road system from 1972 to 1977 has opened up prime coho salmon areas to the roadside angler. Coho salmon have continued to rise in popularity with Juneau area anglers, particularly with the production of coho salmon by rearing facilities and the decline in the abundance of chinook salmon.

Brook trout are very popular for anglers fishing the Salmon Creek Reservoir, although the catch of this species is felt to have increased considerably in the past few years. This reservoir population appears stable under the present ten fish per day bag limit.

The rainbow or steelhead trout catch continues to be small and shows little increase from 45 in 1972 to 48 in 1977. The effort on this species is generally restricted to Peterson Creek and infrequent catches along the estuarine shoreline.

A noted absence in the 1977 catch estimate is that chum salmon and Pacific halibut are not present. Apparently boating anglers have taken over inshore stocks of Pacific halibut such that roadside anglers are unable to reach them. The reason for the decline in the catch of chum salmon is unknown.

Wrangell Area Marine Recreational Harvest Study:

In comparing the 1977 study with the study conducted in 1970 and 1971 a significant decline in the catch of chinook salmon has occurred. The estimated catch increased from 352 to 449 chinook salmon taken from Greys Pass for the years 1970 and 1971 (McHugh et al., 1971, and McHugh et al., 1972). However, during the 1977 study only an estimated 87 of the 360 chinook salmon caught in the Wrangell area came from Greys Pass.

In design the 1970 and 1971 studies covered the Greys Pass area exclusively; whereas, the 1977 study covered the Wrangell area (Figure 3). It is unfortunate that these earlier studies did not cover a larger area to include the Elephants Nose, harbor area, and Babbler Point to give an historical account of these areas.

A modest decline was evident in comparing the Pacific halibut catch from the two previous studies. It declined from 183 in 1970 to 141 in 1971. In the 1977 study no Pacific halibut were observed in the catch. With the increased commercial value of Pacific halibut and the popularity of this location, overharvesting has apparently depleted local numbers.

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